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OF

LONDON

FOR THE YEAR

1891.

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54, HATTON GARDEN, LONDON, E.C.

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1889 Johnson, The Rev. W. F., M.A., *Winder-terrace*, *Armagh*, *Ireland*.
1888 Jones, Albert H., *Shrublands*, *Eltham*, *Kent*.

1884 Kane, W. F. de Vismes, M.A., M.R.I.A., *Sloperton Lodge*, *Kingstown*, *Ireland*.
1884 Kappel, A. W., F.L.S., 5 *Burlington Gardens*, *Chiswick*, W.
1876 † Kay, John Dunning, *Leeds*.
1884 Keays, F. Lovell, F.L.S., 26 *Charles-street*, *St. James*, S.W.
1890 Kenrick, G. H., *Whetstone*, *Somerset-road*, *Edgbaston*, *Birmingham*.
1886 Kew, H. Wallis, 5 *Giesbach-road*, *Upper Holloway*, N.
1890 Kimber, Miss M., *Cope Hall*, *Enborne*, *Newbury*, *Berks*.
1890 King, J. J. F. X., 207 *Sauchiehall-street*, *Glasgow*.
1861 Kirby, William F., F.L.S., 5 *Burlington Gardens*, *Chiswick*, W.
1889 Klapálek, Professor Franz, *Zoological Department*, *Royal Museum*, *Prague*, *Bohemia*.
1887 † Klein, Sydney T., F.L.S., F.R.A.S. (Hon. Treasurer, Middlesex Natural History and Science Society), *The Red House*, *Stanmore*, *Middlesex*.
1876 Kraatz, Dr. G., 28 *Link-strasse*, *Berlin*.

1868 Lang, Colonel A. M., R.E., 7 *Medina Villas*, *West Brighton*.
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1876 Lewis, George, F.L.S., 101 *Sandgate-road*, *Folkestone*.
1886 Livett, H. W., M.D., *Wells*, *Somerset*.

1865 † Llewelyn, Sir J. Talbot Dillwyn, Bart., M.A., F.L.S., *Ynisgerwn, Neath.*

1881 † Lloyd, Alfred, F.C.S., *The Dome, Bognor, Sussex.*

1885 Lloyd, Robert Wylie, *St. Cuthberts, Thurleigh-road Nightingale-lane, Clapham Common.*

1850 Lowe, W. H., M.D., *Woodcote Lodge, Inner Park-road, Wimbledon Park,* S.W.

1850 † Lubbock, The Right Honble. Sir John, Bart., M.P., D.C.L., F.R.S., F.L.S., F.G.S., &c., *High Elms, Farnborough, Kent.*

1880 Lupton, Henry, *Lyndhurst, North Grange-rd., Headingley, Leeds.*

1887 M'Dougall, James Thomas, *Dunolly, Morden-road, Blackheath,* S.E.

1851 † M'Intosh, J.

1888 Mackinnon, P. W., *The Old Brewery, Masuri, Western Himalayas, India.*

1858 McLachlan, Robert, F.R.S., F.L.S., F.Z.S., Treasurer, *Westview, Clarendon-road, Lewisham,* S.E.

1887 Manders, Neville, L.R.C.P., M.R.C.S., *Medical Staff Mess, Rawal Pindi, India.*

1891 Manger, William, 100 *Manor-road, New Cross,* S.E.

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1865 Mathew, Gervase F., R.N., F.L.S., F.Z.S., F.R.G.S., *Lee House, Dovercourt, Essex.*

1887 Mathews, Coryndon, *Erme Wood, Ivybridge, South Devon.*

1860 May, John William, K.N.L., *Blenheim House, Parson's Green-lane, Fulham,* S.W.

1872 † Meldola, Prof. Raphael, F.R.S., F.R.A.S., F.C.S., Vice-President, 6 *Brunswick-square,* W.C.

1885 Melvill, James Cosmo, M.A., F.L.S., &c., *Kersal Cottage, Prestwich, Lancashire.*

1887 Merrifield, Frederic, 24 *Vernon-terrace, Brighton.*

1888 Meyer-Darcis, care of Sogin & Meyer, *Wohlen, Switzerland.*

1880 Meyrick, Edward, B.A., F.Z.S., *Ramsbury, Hungerford, Berkshire.*

1883 Miles, W. H., *The New Club, Calcutta.*
1879 Monteiro, Senhor Antonio Augusto de Carvalho, 72 *Rua do Alecrion, Lisbon.*
1853 Moore, Frederic, F.Z.S., A.L.S., *Claremont House, Avenue-road, Croydon-road, Penge,* S.E.
1886 Morgan, A. C. F., F.L.S., *Villa Nova de Gaya, Oporto, Portugal.*
1889 † Morice, The Rev. F. D., M.A., Fellow of Queen's College, Oxford, 27 *Hillmorton-road, Rugby.*
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1872 † Murray, Lieut. H.
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1886 Neave, B. W., 95 *Queen's-road, Brownswood Park,* N.
1889 Nevinson, Basil George, M.A., F.Z.S., 6 *Tite-street, Chelsea,* S.W.
1887 Newman, The Rev. W. J. H., M.A., *The Vicarage, Steeple Barton, Oxon.*
1878 Newman, Thomas P., F.Z.S., 54 *Hatton Garden,* E.C.; and *Hazelhurst, Haslemere, Surrey.*
1890 Newstead, R., *The Museum, Chester.*
1882 Nicéville, Lionel de, F.L.S., C.M.Z.S., *Indian Museum;* and 13 *Kyd-street, Calcutta.*
1886 Nicholson, William E., *School Hill, Lewes, Sussex.*
1886 Norris, Herbert E., 15 *Market Place, Cirencester.*
1878 Nottidge, Thomas, *Ashford, Kent.*

1869 Oberthür, Charles (fils), *Rennes, France.*
1877 Oberthür, René, *Rennes, France.*
1883 Oldfield, George W., M.A., F.L.S., F.Z.S., 21 *Longridge-road, Earls Court,* S.W.
1873 Olivier, Ernest, *Ramillons, près Moulins (Allier), France.*
1886 Olliff, Arthur Sidney, *Government Entomologist, Department of Agriculture, Macquarie-street, Sydney, N. S. Wales.*
1878 Ormerod, Miss Eleanor A., F. R. Met. S., *Torrington House, Holywell Hill, St. Albans, Herts.*
1880 Ormerod, Miss Georgiana, *Torrington House, Holywell Hill, St. Albans, Herts.*
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1883 Péringuey, Louis, *South African Museum, Cape Town, South Africa.*

1879 Perkins, Vincent Robt., *Wotton-under-Edge, Gloucestershire.*

1887 Phillips, Charles Edmund Stanley, *Castle House, Shooter's Hill, Kent.*

1891 Pierce, Frank Nelson, 143 *Smithdown Lane, Liverpool.*

1885 Poll, J. R. H. Neerwort van der, *Heerengracht* 476, *Amsterdam.*

1870 † Porritt, Geo. T., F.L.S., *Greenfield House, Huddersfield.*

1884 † Poulton, Edward B., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., *Wykeham House, Banbury-road, Oxford.*

1851 Preston, The Rev. Thomas Arthur, M.A., F.L.S., *Thurcaston Rectory, Leicester.*

1876 Preudhomme de Borre, Alfred , *Rue Scutin* 11, *Schaerbeck, Brussels.*

1878 Price, David, 48 *West-street, Horsham, Sussex.*

1886 Ragonot, E. L. (Ex-President Ento. Soc. France), 12 *Quai de la Rapée, Paris.*

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1874 Reed, Edwyn C., *Baños de Cauquenes, Valparaiso, Chili.*

1891 Reid, William, *Pitcaple, Aberdeenshire.*

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1888 Rothschild, The Honble. Walter de, F.Z.S., 148 *Piccadilly*, W.; and *Tring Park, Tring, Herts.*
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1861 † Saunders, G. S., 20 *Dents-rd., Wandsworth Common*, S.W.
1886 Saunders, Prof. Wm., *London, Ontario, Canada* (President of the Entomological Society of Ontario).
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1864 Semper, George, care of *Bernhard Beer, Esq.*, 10 *Newgate-street*, E.C.
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1886 Surrage, J. Lyddon, B.A., 76 *Regent's Park-road*, N.W.
1882 Swanzy, Francis, *Stanley House, Granville-road, Sevenoaks.*
1884 Swinhoe, Colonel Charles, F.L.S., F.Z.S., *Avenue House, Cowley-road, Oxford.*
1876 Swinton, A. H., *Tudor Villas, Gery-street, Bedford.*

1886 Theobald, F. V., B.A., *Chestnut Grove, Kingston-on-Thames.*
1889 Thornewill, The Rev. C. F., M.A., *Burton-on-Trent.*
1859 † Trimen, Roland, F.R.S., F.L.S. (Curator of South African Museum), *Cape Town, Cape Colony.*
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1886 Tutt, J. W., *Rayleigh Villa, Westcombe Park, Blackheath*, S.E.

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1889 Vivian, H. W., *Glenafon, Taiback, South Wales;* and *Trinity College, Cambridge.*

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1886 Walker, Alfred O., F.L.S., *Nant Glyn, Colwyn Bay, Denbighshire.*
1870 Walker, The Rev. Francis Augustus, D.D., F.L.S., *Dun Mallard, Cricklewood*, N.W.

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1889 WALLEY, The Rev. John, *Wuhu, China.*

1866 † WALSINGHAM, The Right Hon. Lord, M.A., LL.D., F.R.S., F.L.S., F.Z.S., VICE-PRESIDENT, High Steward of the University of Cambridge, *Eaton House*, 66 A *Eaton-square*, S.W.; and *Merton Hall, Thetford, Norfolk.*

1886 WARREN, William, M.A., 3 *Kempson-road, Walham Green*, S.W.; and *British Museum, Cromwell-road*, S.W.

1869 WATERHOUSE, Charles O., *Ingleside, Avenue Gardens, Acton*, W.; and *British Museum, Cromwell-road*, S.W.

1891 † WATSON, Capt. E. Y., F.Z.S., Indian Staff Corps, 5 *Lypiatt-terrace, Cheltenham.*

1845 WEIR, John Jenner, F.L.S., F.Z.S., *Chirbury, Beckenham, Kent.*

1876 † WESTERN, E. Young, 27 *Craven Hill Gardens, Bayswater*, W.

* WESTWOOD, John Obadiah, M.A., F.L.S. (Professor of Zoology in the University of Oxford), HONORARY LIFE PRESIDENT, 67 *Woodstock-road, Oxford.*

1882 WEYMER, Gustav, *Sadowa-strasse* 21 *a, Elberfeld, Rhenish Prussia.*

1886 WHEELER, Francis D., M.A., LL.D., *Paragon House School, Norwich.*

1868 † WHITE, F. Buchanan, M.D., F.L.S., *Annat Lodge, Perth*, N.B.

1865 WHITE, The Rev. W. Farren, M.A., *Stonehouse Vicarage, Gloucestershire.*

1884 WHITE, William, *The Ruskin Museum, Meersbrook Park, Sheffield.*

1882 WILLIAMS, W. J., *Zoological Society, Hanover-square*, W.

1881 WOOD, The Rev. Theodore, *Merton Cottage, Baldock, Herts.*

1891 WROUGHTON, R. C., Conservator of Forests, *Poonah, India.*

1888 YERBURY, Major J. W., R.A., *Colombo, Ceylon.*

1886 YOUNG, Morris, *Free Museum, Paisley*, N.B.

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THE

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1891.

February 4, 1891.

FREDERICK DUCANE GODMAN, Esq., M.A., F.R.S., President, in the chair.

Donations to the Library were announced and thanks voted to the respective Donors.

Nomination of Vice-Presidents.

The President nominated Lord Walsingham, M.A., F.R.S., Professor R. Meldola, F.R.S., and Dr. D. Sharp, F.R.S., Vice-Presidents for the Session 1891–92.

Election of Fellows.

Dr. Thomas A. Chapman, M.D., of "Firbank," Hereford; Mr. Horace St. John Donisthorpe, of 37, Courtfield Gardens, S.W.; Mr. F. W. Frohawk, of 9, Dornton Road, Balham, S.E.; Mr. E. Ernest Green, of 10, Observatory Gardens, Kensington, W.; Mr. G. F. Hampson, B.A., of Thurnham Court, Maidstone; Mr. F. J. Hanbury, F.L.S., of 69, Clapton Common, Upper Clapton, N.E.; and the

Hon. Mary Cordelia E. Leigh, of Stoneleigh Abbey, Kenilworth, were elected Fellows of the Society.

Exhibitions, &c.

Mr. C. J. Gahan called attention to a larva which he had exhibited at the meeting of the Society on the 1st October last, when some doubt was expressed as to its affinities. He said that Prof. Riley and Dr. Packard had since suggested that the larva was that of a dipterous insect of the family *Blepharoceridæ;* he was quite of the same opinion, and thought it might probably be referred to *Hammatorrhina bella*, Löw, a species from Ceylon.

Mr. Tutt exhibited a long series of *Agrotis pyrophila*, taken last year by Mr. Reid, near Pitcaple, in Aberdeenshire, and remarked that this species had been commoner than usual last year in Scotland, the Isle of Portland, and the Isle of Man. He also exhibited long and variable series of *Melitæa aurinia* (*artemis*), *Triphæna orbona*, *Abraxas grossulariata*, and *Melanippe fluctuata*, all from the same locality in Aberdeenshire.

The Rev. Canon Fowler exhibited a cocoon of *Deiopeia pulchella*, recently received from Lower Burmah.

Mr. C. O. Waterhouse exhibited specimens of *Scyphophorus interstitialis*, a Mexican species, and *Aceraius Comptoni*, a Ceylonese species, recently taken by Mr. Bowring in his greenhouse. He also exhibited, on behalf of Miss Emily M. Sharpe, a specimen of *Daphnis hypothous*, Cramer, a native of Borneo, Java, and Ceylon, caught some years ago at Crieff, N.B. The specimen was formerly identified as *Chærocampa nerii*, under which name its capture was recorded in 'The Entomologist,' xiii. p. 162 (1880).

The Rev. Dr. Walker exhibited a collection of Insecta and Arachnida, including many species of Orthoptera and Scorpiodea, recently received from Jerusalem.

Papers &c., read.

Mr. Frederick Enock read an interesting paper entitled "The Life-History of the Hessian Fly." He commenced by mentioning the fact that though nearly a hundred papers

had been written on the Hessian Fly by entomologists hailing from all parts of the globe, but few had the stamp of genuine originality, the greater part being mere compilations by so-called "arm-chair naturalists," whose ignorance of the subject was proved by the mistakes they copied from the papers of previous compilers, who seldom gave the dates when their observations were supposed to have been made, which dates he considered to be of the utmost importance when following out the life-history of any insect. Those Fellows who desired information on the subject would find every fact relating to the history of the insect mentioned in the full account in the Transactions, *verified by the date and time of day* when the observation of such fact was made.

The author stated that the Hessian Fly generally makes its first appearance in May, the greater part of the first brood emerging during June, and many up to the middle of July. Copulation takes place during the early morning hours, immediately after which the female proceeds to oviposit on the wheat and barley, laying her eggs in the longitudinal ridges of the upper surface of the freshest leaves, placing them in rows of from three to ten on each plant, and so laid that when the larvæ emerge their heads are towards the base of the leaves. In warm moist weather the eggs hatch in four days; the tiny larvæ work their way down the ridges until they arrive at the leaf-sheath, between which and the stem they force their way down to a short distance above the joint, where they fix themselves head downwards and towards the stem, the juices of which the larvæ steadily appropriate for their sustenance. As they increase in size so does the barley plant; but the latter is much weakened by the constant drain, which goes on for about twenty days, and though an ear is formed it is generally a poor one, sickly looking, with half-developed grain too heavy for the weakened stem to bear through a heavy storm of wind or rain, and it soon bends down at the injured joint, just above the point where the larvæ have been feeding; the ear resting on the ground is destroyed by the first prowling mouse. When full grown the larva discontinues feeding, the outer skin dries up and becomes of a bright red chestnut colour somewhat resembling a "*flaxseed*"; and it was when in this

stage that Mr. George Palmer first discovered it in Hertfordshire on July the 27th, 1886, though most practical entomologists are now agreed that it had then been present in this country for some years. Whilst the change from larva to "flaxseed," or, more correctly speaking, to the coarctate larva or the puparium state has been going on, a most wonderful change has taken place inside; the larva in its *third* stage becoming detached and perfectly free from the dried up skin of the original larva. Below the mouth, on the second segment, is now to be seen the so-called "anchor process"; various authors have expressed their opinions as to the use of this organ, the original idea being that it was used by the larva in obtaining its food. This error has been copied in the most orthodox "follow-my-leader" fashion, clearly proving that the various stages had not been examined, for anyone who will look at a *feeding* larva will see at once that the anchor process is not present.

Mr. Enock said that although all authors state that the larva fixes itself head *downwards* and towards the stem, not one has ever explained how the fly emerges from this position. It was only after long and most careful observation and dissection of the larva in its third stage that he was enabled to discover the true purpose of this small, and apparently insignificant, piece of apparatus known as the "anchor process." When the larva has arrived at full growth and reached the puparium state, the internal larva lies dormant during the winter and spring months until the middle of May, when it commences to *reverse its position* and turn round within the puparium. This it is enabled to do by pressing the bifid points of the anchor process against the inside of the shell; then moving its body a short distance down it presses the sharp dorsal spines into the opposite side, releases the anchor process, and fixing it a little higher up it moves the body a little round and downwards; the head is again moved *upwards*, and so these movements go on until the larva has completely reversed its position from head *downwards and inwards* to head upwards and *outwards* in close proximity to the outer leaf-sheath. The larva soon changes to a pupa, casting its skin and anchor process; in about thirteen days the fly is matured, and

the pupa forces its way through the brittle skin of the puparium and leaf-sheath, and in less than an hour and a half the fly has emerged, dried its wings, and flown away to seek a partner.

The author stated that careful experiments, carried on from year to year, to ascertain whether the Hessian Fly is parthenogenetic have proved that it is not; but an interesting fact was discovered regarding the polygamous habits of the male, many having been isolated and proved to be able to impregnate six females. Puparia kept perfectly dry for *two* years produced perfect flies, showing that it was possible for the pest to have been introduced into America by the Hessian troops. Mr. Enock thought that the only way to keep this terrible scourge down was by breeding the parasites and turning them down in infested localities; but he did not see any chance that such a suggestion,—though its utility had been proved by hard facts,—would ever be acted on in Great Britain. In America, however, Professor Riley, the eminent State Entomologist, had accepted Mr. Enock's offer to send over puparia containing the most prolific parasite, viz., *Semiotellus nigripes;* and Mr. Enock said that before the end of March between two and three thousand parasitised puparia would be in the hands of Professor Riley, who was not one to chill the enthusiasm of an entomologist by saying "It can't be done," or "It is not practicable."

The paper was most elaborately illustrated by some sixty photographs thrown upon a large screen by the aid of a powerful oxy-hydrogen lantern, so that every detail could be distinctly seen by the large number of Fellows and visitors present at the meeting.

Mr. G. H. Verrall said he believed the Hessian Fly was no more a recent introduction into this country than the Cabbage White Butterflies. He thought that the fact of its having so many parasites proved it to be an old inhabitant of Britain. When it was first introduced into America its parasites did not accompany it, and it consequently spread very rapidly; but since its parasites have appeared it has not done so much damage. Mr. Verrall further stated that the presence of the Hessian Fly had long

been known in Essex and Lincolnshire, and that in the former county affected wheat was known as "Knickle-down," *i. e.* "Knuckle-down" wheat. The discussion was continued by Mr. Godman, Mr. Enock, and others.

Mr. Roland Trimen communicated a paper entitled "On some recent Additions to the List of South African Butterflies."

Mr. H. W. Bates communicated a paper entitled "Additions to the Carabideous Fauna of Mexico, with remarks on species previously recorded."

Mr. W. F. Kirby read a paper entitled "Notes on the genus *Xanthospilopteryx*, Wallgr."

Dr. D. Sharp contributed a paper entitled "On the Rhynchophorous Coleoptera of Japan," Pt. 2.

March 4, 1891.

The Rt. Hon. Lord Walsingham, M.A., F.R.S., Vice-President, in the chair.

Donations to the Library were announced and thanks voted to the respective Donors.

Exhibitions, &c.

Mr. F. P. Pascoe exhibited, and made remarks on, a curious Coleopterous larva, with a case somewhat resembling that of the Lepidopterous genus *Psyche*, which was found at the Theatre of Bacchus, Athens.

Mr. J. W. Douglas sent for exhibition specimens of *Icerya* (*Crossatosoma*) *ægyptiaca*, which, through the kindness of Mr. A. D. Michael, he had received from Alexandria on the 19th January last. It was stated that in travelling most of them had become loose, and had lost their waxen appendages; but a few still remained on the stems of their food-plant. In connection with this subject, Mr. G. H. Verrall alluded to a Dipterous parasite of *Icerya* from Adelaide—*Lestophonus iceryæ*, Williston—which had been bred from *Icerya Purchasi*, Mask., last February. Mr. M'Lachlan and Lord Walsingham continued the discussion.

Mr. R. Adkin exhibited a long and interesting series of *Triphæna comes* (*orbona*), from various parts of the South of England, Yorkshire, Forres, the Isle of Man, the Isle of Lewis, and the North of Ireland.

Mr. G. F. Hampson exhibited a series of varieties of *Plotheia frontalis*, Walk., which was the only species in the genus, and confined to Ceylon. He said that the varied forms of this species had been described under twenty-one different names by Walker, Felder, and Moore.

Mr. F. Merrifield exhibited a number of specimens showing that the colouring of the spring emergence of *Selenia illustraria*, as well as that of the summer emergence, was materially affected by the temperature to which the pupa was exposed in its later stages. Three separate broods had each been divided into two parts, the pupæ of one division being exposed to a temperature of 80° Fahr., those of the other division to 60°. The whole of those so treated, so far as they had yet appeared, were exhibited. Those of the former division were on the upper surface of a rather uniform light chestnut orange, and contrasted with the greater richness and darkness and variety of colour in the latter, the lightest specimen of which was, in each of the three broods, darker than the darkest of the other division. On the undersides the differences were equally marked. He also exhibited samples of two summer broods of *S. illustraria* not exhibited before, where there were similar differences; in this case the cooler division had been at about 60° to 65°, the other division at 80°; also a series of about fifty *Ennomos autumnaria* not before shown, rather more than half having been during the later pupal stages at a temperature of 80°, and the rest of them during these stages at the ordinary temperature of a room in July, ranging from about 65° to 70°, the general colouring of the latter being much the darker. There could be no other rational explanation of these differences than that they were caused by temperature; darkness, richness and variety of colouring being in the case of these insects promoted by the lower temperature. It need scarcely be added that a temperature influence, which thus extended to the colouring of the individuals belonging to both the spring and the summer forms of a double brooded species showing

great seasonal dimorphism, and to a variable single brooded species, must be of wide general application; how general, could only be ascertained by the co-operation of many observers; and he ventured to hope that entomologists would, as opportunity offered, turn their attention to the subject, and report the results in the publications devoted to this branch of natural history. He thought almost any variable species, especially where the variations were associated with climate or season, would be worth trying. The means by which temperature operated was a question of difficulty which such experiments and observations might throw light on. Mr. Merrifield said he thought it had been shown that general retardation was not a satisfactory explanation, for a pupa of 18 weeks, which for the last 8 or 10 days was exposed to 80°, thus being 19 to 20 weeks in pupa, produced a lighter-coloured moth than one of only 2 or 3 weeks that was exposed for 18 or 20 days to 60°, and was thus about 5 or 6 weeks in the pupal condition. It was of course exceedingly difficult in ordinary cases to distinguish between cold and retardation as a cause, because the former produced the latter, and for practical purposes it did not matter; but theoretically it was important. Prof. Weismann's theory, founded on the proposition that in seasonally dimorphic species the ancestral form could not be made to assume the characters of the form of later origin, but that the latter could be made to assume those of the former, did not here fully meet the case so far as the striking characteristic of colour was concerned, for it had been shown that either the spring or the summer emergence was ready to assume the colouring proper to the other when the appropriate temperature stimulus was applied.

Mr. Elwes said that in his experience in many parts of the Palæarctic region, in Japan, in the Taunus Mountains, on the north-eastern shores of the Mediterranean, in the Canary Islands, and elsewhere, where there was a combination of heat and moisture, all the commoner species of Lepidoptera occurring in these countries and districts attained a larger size and a greater brilliancy of colouring than in colder and drier regions; and he referred to such species, amongst others, as *Pieris brassicæ* and *Argynnis paphia*. The discussion was continued by Mr. Jacoby, Mr. Fenn, and others.

Mr. W. H. B. Fletcher exhibited a long series of *Zygæna loniceræ* from York, and *Zygæna filipendulæ* from Shoreham, Sussex; also a series of hybrids obtained by crossing these two species. He stated that the eggs obtained from these hybrids were all infertile. Lord Walsingham said this latter fact was extremely interesting.

Mr. F. W. Frohawk exhibited a living specimen of an ichneumon which had just emerged from a chrysalis of *Papilio turnus*.

Mr. C. J. Gahan exhibited a number of species belonging to the genera *Lema* and *Diabrotica*.

Paper read.

Mr. C. J. Gahan read a paper entitled "On mimetic resemblances between species of the Coleopterous genera *Lema* and *Diabrotica*." Lord Walsingham, Mr. Jacoby, Colonel Swinhoe, and Mr. Champion took part in the discussion which ensued.

April 1, 1891.

Professor Raphael Meldola, F.R.S., Vice-President, in the chair.

Donations to the Library were announced and thanks voted to the respective Donors.

Election of Fellows.

Mr. G. A. Booth, of Fern Hill, Grange-over-Sands, North Lancashire; and Mr. W. Manger, of 100, Manor Road, New Cross, S.E., were elected Fellows of the Society.

Exhibitions, &c.

Mr. H. J. Elwes showed a small but very interesting collection of butterflies from Laggan Alberta, N.W. Territory of Canada, taken by Mr. Bean at high elevations in the Rocky Mountains. Amongst them were *Colias elis*, Streck., which seemed to be very close to, if not identical with, *C. hecla* of Europe; *Argynnis alberta*, W. H. Edw.; and *Chionobas subhyalina*, W. H. Edw. The resemblance between the butter-

flies of this locality and those found on the Fells of Lapland was very striking, some of the species being identical, and others very closely allied. Mr. Elwes said that it was another proof, if one were wanted, of the uniformity of the butterflies found throughout the boreal region in the Old and New Worlds.

Mr. G. C. Champion exhibited several insects recently received from Mr. J. J. Walker, from Hobart, Tasmania. The collection included a curious species of *Forficulidæ*, with asymmetrical forceps, from the summit of Mount Wellington; two mimetic species of *Œdemeridæ* belonging to the genus *Pseudolycus*, Guér., and the corresponding *Lycidæ*, which were found with them; also specimens of both sexes of *Lamprima rutilans*, Er.

Mr. N. M. Richardson exhibited a specimen of *Zygæna filipendulæ* with five wings; a second specimen of the same species with the middle legs on the right side much dwarfed; four specimens of *Gelechia ocellatella*, including a pink variety, bred from *Beta maritima;* four specimens of *Tinea subtilella*, a species new to Britain, taken last August in the Isle of Portland; also specimens of *Nepticula auromarginella*, a species new to Britain, bred from larvæ taken near Weymouth on bramble. Dr. Sharp and Mr. M'Lachlan commented on the structural peculiarities of the two specimens of *Zygæna*.

Mr. C. Fenn exhibited a series of *Tæniocampa instabilis*, which had been bred during the recent severe weather. They were all bred from ova laid by the same female, and many of them were of an abnormally pale colour. Mr. Fenn said that, according to Mr. Merrifield's theory, these pale specimens, in consequence of the temperature to which they had been subjected in the pupal state, ought to have been very dark. Mr. Jenner Weir, referring to the pale specimens, said he had never before seen any of so light a colour.

Mr. W. Dannatt exhibited a butterfly belonging to the genus *Crenis*, recently received from the Lower Congo. He said he believed the species was *Crenis Benguelæ*.

Mr. G. A. J. Rothney sent for exhibition several specimens of an ant (*Sima rufo-nigra*), from Bengal, together with specimens of a small sand-wasp (*Rhinopsis ruficornis*) and a spider

(*Salticus*), both of which closely mimicked the ant. It was stated that the specimens of *Rhinopsis* exhibited had lately been received from Mr. R. C. Wroughton, Conservator of Forests, Poona.

Papers &c., read.

Mr. Rothney communicated the following short paper on the subject of the ants and mimicking sand wasps and spiders exhibited, entitled "Further notes on Indian Ants."

"In a paper on 'Indian Ants,' read at the meeting of this Society, April 3rd, 1889, I referred to a case of a sand-wasp (since described by Mr. Cameron as *Rhinopsis ruficornis*) closely mimicking the ant, *Sima rufo-nigra*, which is a common ant in Bengal. I had only observed three of these wasps in company with the ants, and of these had only captured one, which was exhibited at that meeting. By the last mail I received from Mr. R. C. Wroughton, Conservator of Forests, Poona, several specimens of this wasp which I have sent for exhibition. Mr. Wroughton writes:—

'I am sending you a parcel containing some specimens of the *Ampulex* (*Rhinopsis*) which mimics *Sima rufo-nigra*. I found an oasis of irrigation in the Konkau, and there was *rufo-nigra* like a fly in amber, and moreover any quantity of the *Rhinopsis*; I got about a dozen specimens. I also saw two or three of these wasps collar a peculiar cockroach by the antennæ and lead it off into a crack in the bark, but as the cockroach reappeared smiling each time I don't know what was up. The ants took no notice of the cockroach.'

"I consider the point of interest to be that directly this ant, *Sima rufo-nigra*, is found in some numbers on the Western side of India, this mimicking wasp should also appear. Mr. Wroughton's observations and captures of *Rhinopsis* thus very conclusively confirming this curious case of mimickry. It is also interesting that both this wasp and a spider, *Salticus*, should so closely mimic this ant; but as *Sima rufo-nigra* is a strong fierce species armed with an exceptionally powerful and pungent sting, this may afford some reason for the imitation."

Mr. G. C. Champion read a paper entitled "A list of the Heteromerous Coleoptera collected by Mr. J. J. Walker, R.N.,

in the neighbourhood of Gibraltar, with descriptions of four new species." At the conclusion of the meeting a discussion ensued, in which Mr. Kirby, Mr. Elwes, Mr. M'Lachlan, Mr. Jenner Weir, Dr. Sharp, and Mr. Crowley took part.

May 6, 1891.

Frederick DuCane Godman, Esq., M.A., F.R.S., President, in the chair.

Donations to the Library were announced and thanks voted to the respective Donors.

Election of Fellows.

Mr. Robert A. Dallas Beeching, of 24, St. James's Road, Tunbridge Wells, Kent; Mr. H. Shortridge Clarke, of Douglas, Isle of Man; Monsieur Léon Fairmaire, of 21, Rue du Dragon, Paris; Mr. Wm. Reid, of Pitcaple, Aberdeenshire; and Mr. Nelson M. Richardson, B.A., of Montevideo, Weymouth, were elected Fellows of the Society.

Exhibitions, &c.

Dr. D. Sharp exhibited a number of eggs of *Dytiscus marginalis* laid on the sheath of a species of reed, and commented on the manner of their oviposition, which he said had been fully described by Dr. Régimbart.

The Rev. A. E. Eaton exhibited a collection of *Psychodidæ* from Somersetshire, including six species of *Psychoda*, eleven species of *Pericoma*, and one species of *Ulomyia*. Mr. M'Lachlan commented on the interesting nature of the exhibition.

Mr. P. Crowley exhibited a specimen of *Prothoë caledonia*, a very handsome butterfly from Perak; and a specimen of another equally handsome species of the same genus from Tonghou, Burmah, which was said to be undescribed.

The Secretary read the following letter from Mr. Merrifield in connection with certain remarks made by Mr. Fenn at the April meeting of the Society:—

" 24, Vernon Terrace, Brighton,
20th April, 1891.

My Dear Sir,

As I fear that I shall be unable to be present at the meeting of the Society on the 6th May, I write to ask you to be good enough to read this letter, to correct some surprising errors into which Mr. C. Fenn, if he is correctly reported, has fallen. That gentleman is reported, in the 'Proceedings'* of the Entom. Soc. of 1st April, to have said, with reference to a brood of *T. instabilis* which he exhibited, including some abnormally pale examples, that they 'had been bred during the recent severe weather,' and that, 'according to Mr. Merrifield's theory, they ought to have been very dark.' Further, the same gentleman is reported to have stated, at the South London Entomological Society's meeting of the 9th April, of the same brood, that these pale varieties 'completely overthrow Mr. Merrifield's suggestion that exposure to great cold just before emergence tended to produce dark coloration, as these were exposed to very extreme cold.' If Mr. Fenn will be so good as to refer to my views, which are to be found recorded in the 'Transactions' of the Society, he will see that he has entirely misapprehended them. I have never suggested, or imagined, that coloration is, in *all species* of Lepidoptera, affected by exposure of the pupa to a low temperature. What I have stated (and found, by the invariable result in many broods, some as healthy as could be seen) is, that exposure of the pupa, shortly (not immediately) before emergence, to a low temperature (defined in the next sentence) does tend to produce darkness of coloration in *S. illustraria*, both summer and spring emergence, and in *E. autumnaria, and probably in many other species* (Ent. Trans., 1891, pp. 164, 167). This of course is quite consistent with *T. instabilis* not being so affected. Secondly, as to the degree of low temperature which is efficacious, I have expressly stated 'that in the species operated on, a difference *between 80° and 57°* is

* See reports of 'Proceedings' of April meeting of the Ento. Soc. in the 'Athenæum,' 'Nature,' 'The Zoologist,' the 'Entomologist,' the 'Entomologist's Monthly Magazine,' &c.

sufficient to produce the *extreme variation* in darkness caused by temperature, *a further lowering of the temperature having no further effect*' (Ibid., see also p. 158). In Mr. Fenn's experiment the temperature must have been below 40°; consequently the results are entirely consistent with my theory.

Yours very truly,

H. Goss, Esq." F. Merrifield.

The Secretary also read the following letter which Lord Walsingham had received from Sir S. A. Blackwood, the Secretary of the Post Office, in answer to the memorial which, on behalf of the Society, had been submitted to the Postmaster-General, asking that small parcels containing scientific specimens might be sent to places abroad at the reduced rates of postage applicable to packets of *bonâ fide* trade patterns and samples:—

"General Post Office, London,
April 13th, 1891.

My Lord,

Referring to your Lordship's letter of the 18th of last month, and to the memorial which you enclosed, on behalf of various persons engaged in scientific studies, I am directed by the Postmaster-General to acquaint you that he is anxious to give effect, so far as lies in his power, to the desire of the memorialists, that small parcels containing scientific specimens, &c., may be sent to places abroad at the reduced rates of postage at present applicable only to packets of *bonâ fide* trade patterns and samples.

Your Lordship will no doubt be glad to learn, therefore, that so far as this Department is concerned, scientific specimens sent by sample post, and addressed to places abroad, will not be stopped in future; but I must state that this Department cannot guarantee the delivery of such specimens abroad, inasmuch as they do not come within the definition of sample packets as prescribed by the Postal Union.

I have the honour to be, &c.,

S. A. Blackwood.

The Rt. Hon. Lord Walsingham, F.R.S., &c."

June 3, 1891.

Frederick DuCane Godman, Esq., M.A., F.R.S., President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of Fellows.

Mr. J. M. Adye, of Somerford Grange, Christchurch, Hants; and the Rev. John Seymour St. John, B.A., of 42, Castlewood Road, Stamford Hill, N., were elected Fellows of the Society.

Exhibitions, &c.

Mr. E. B. Poulton exhibited the young larvæ of *Endromis versicolora* in the second stage. At this period the larvæ arrange themselves in small groups upon the leaves and leaf-stalks of the birch, and when disturbed they raise the anterior part, bending the head over the dorsal surface of the posterior part of the body. In this attitude they strongly remind the observer of those Tenthredo larvæ, which, when irritated, bend the tail forwards over the anterior part of the body. The fact that the head is raised in the one, and the tail in the other, does not cause any conspicuous difference when the larvæ are seen from a little distance. The common Tenthredo larva, *Cræsus septentrionalis*, is about the same size as these small Lepidopterous larvæ, feeds in similar small groups when large (when small the groups contain far more individuals), and also often frequents the birch. Experiments have shown that Tenthredo larvæ are, as a whole, far more unpalatable than Lepidopterous larvæ, so that the resemblance would be of advantage to the *Endromis* larvæ.

Mr. Poulton also showed the cocoons of *Eriogaster lanestris*. These cocoons are generally believed to be formed of silk so tightly woven as to produce the compact egg-shell like structure which gives the common name of "Egger" to the moth. Mr. Poulton had found, with the help of Professor Meldola, the texture is due to the fact that the silken walls are plastered over with a hardened paste of calcium oxalate. The silken constituent forms but a small part of the whole;

it is in the form of a very loose and open frame-work which is first constructed, and serves as a foundation for the paste which is poured out upon it. The calcium oxalate is secreted by the malpighian tubules of the larva, and is in all probability poured out from the anus. Dissected specimens of mature larvæ which had not yet spun their cocoons were also exhibited, and it was seen that the malpighian tubules were injected with a chalky secretion, the calcium oxalate.

Mr. W. H. Blandford called attention to the fact that the larvæ of *Liparis monacha* remained in small groups on the bark of the tree for about a week after emerging from the eggs, and that this fact was taken advantage of by the German foresters to destroy them. Also that he had himself verified the statement that uric acid can be detected in the malpighian tubes of insects. Mr. M'Lachlan agreed that the demonstration that the malpighian tubes were of the nature of renal organs was now satisfactory.

Mr. C. J. Gahan exhibited two species of Coleoptera that he considered to possess a mimetic resemblance, viz. *Estigmena chinensis*, one of the *Hispidæ*, and a nondescript Lamiid allied to *Pemptolasius*. He called attention to a peculiar structure of the antennæ in the latter by which the resemblance was increased.

Mr. Tutt exhibited a hybrid between *Amphidasis prodromaria* and *A. betularia*, obtained by Dr. Chapman. Mr. Stainton commented on the fact that the two insects appeared at different times; and Mr. Tutt stated that the *A. betularia* had been subjected to forcing, so as to cause it to emerge at the same time as *A. prodromaria*.

Mr. Tutt also exhibited forms of *Caradrina*, some of which he said were considered distinct on the Continent, though they were not recognised as such in this country, viz. *Caradrina taraxaci* (*blanda*), *C. superstes*, Tr., from Sligo, and *C. superstes*, H.-S., considered as synonymous with *superstes*, Tr., but apparently more closely allied to *C. ambigua*.

Mr. Bristowe exhibited varieties of *Arctia menthastri*, some of which had been fed on mulberry and others on walnut; no difference was observed in the variation.

Mr. G. Elisha exhibited larvæ in their cases of *Coleophora vibicigerella* and *C. maritimella*.

Paper read.

Mr. A. G. Butler communicated a paper entitled "Additional notes on the synonymy of the genera of Noctuid Moths."

July 1, 1891.

Frederick DuCane Godman, Esq., M.A., F.R.S., President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of a Fellow.

The Rev. John Isabell, of St. Sennen Rectory, Penzance, was elected a Fellow of the Society.

Exhibitions, &c.

Mr. Jacoby exhibited a specimen of a species of Coleoptera belonging to the family *Galerucidæ*, with the maxillary palpi extraordinarily developed.

Canon Fowler, on behalf of Mr. Wroughton, Conservator of Forests, Poona, exhibited specimens of a bug imitating an ant, *Polyrachis spiniger*, and of a spider imitating a species of *Mutilla*, and read the following notes:—"I have taken a good many specimens of a bug which has achieved a very fair imitation of *Polyrachis spiniger* (under the same stone with which it may be found), even to the extent of evolving a pedicle and spines in what, were it an ant, would be its meta-notum. Curiously enough, however, these spines are apparently not alike in any two specimens. Is it that this bug is still waiting for one of its race to accidentally sport spines more like those of *P. spiniger*, and thus to set the ball of evolution rolling afresh? or is it that the present rough copy of *spiniger's* spines is found sufficient to deceive? The bug has also been found in the Nilgherries. Mr. Rothney

remarks on the above species :—' I have not found the species mimicking *Mutilla ;* but in Calcutta and Barrackpore, where *P. spiniger* is a tree ant, forming its net by spinning together the twigs of a shrub, the mimicking bug also assumes arboreal habits, and may be found on the trunks of trees with the ants.' "

Mr. Porritt exhibited living specimens of *Eupithecia extensaria* and *Geometra smaragdaria :* the position assumed by the former proved conclusively that it had rightly been placed in the genus *Eupithecia.*

Mr. Crowley exhibited two specimens of a *Papilio* from the Khasia hills, belonging to an undescribed species allied to *P. papone*, sub-generic section *Chilades.* Col. Swinhoe remarked that he possessed a specimen from Northern Burmah. Mr. Moore and others took part in the discussion which followed.

Mr. Dallas Beeching exhibited a specimen of *Plusia moneta*, recently taken by himself at High Woods, Tonbridge, and specimens of *Gonepteryx cleopatra*, lent him for exhibition, which were alleged to have come from the same locality.

Dr. Algernon Chapman exhibited the larva of *Micropteryx calthella*, and read the following notes :—" The larvæ were obtained by placing moths in a cage with damp moss, dead leaves, and other *débris* off the surface of the ground. Into this the moths crept to a depth of half-an-inch, forcing their way into narrow cavities, and laid their eggs in groups of six or twelve. The eggs are clothed with fine hairs, tipped with refractive particles. The larva, about a millimetre in length, possesses on each segment eight processes of a globular form raised on a very slight pedicle. Besides the thoracic legs, each of the abdominal segments (eight) possesses a pair of minute jointed legs of the same type as the thoracic. There are also a pair of long jointed antennæ."

Papers &c., read.

Col. Swinhoe read a paper " On new species of Heterocera from the Khasia Hills."

Mr. Crowley read a paper " On a new species of *Prothoe.*"

Mr. C. J. Gahan read a paper " On the South American

species of *Diabrotica*," Part II., being a continuation of Dr. Baly's paper on the same genus published in the Society's Transactions for 1890, Part I.

Mr. W. F. Kirby communicated a paper entitled "Notes on the Orthopterous family *Mecopodidæ*."

Prof. Westwood communicated a paper entitled "Notes on *Siphonophora artocarpi*," referring to an appendage of the eyes which had been overlooked in his previous description.

August 5, 1891.

Frederick DuCane Godman, Esq., M.A., F.R.S., President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of Fellows.

Mr. Arthur J. Chitty, of 33, Queen's Gate Gardens, S.W.; and Captain E. G. Watson, of 5, Lypiatt Terrace, Cheltenham, were elected Fellows of the Society.

Death of the Hon. Librarian.

The President announced the death of Mr. Ferdinand Grut, the Hon. Librarian of the Society, and commented on the valuable services which the deceased gentleman had rendered the Society for many years past.

Exhibitions, &c.

Dr. D. Sharp exhibited *Japyx solifugus*, from the Eastern Pyrenees, and stated that in his opinion it was a connecting link between the *Thysanura* and *Dermaptera*. He also exhibited pupæ of *Dytiscus marginalis*; one of these was perfectly developed, with the exception that it retained the larval head: this was owing to the larva having received a slight injury to the head. Dr. Sharp also exhibited specimens of *Ophonus puncticollis* and allied species, and said that Thomson's characters of the three Swedish species, *O. puncticollis*, *O.*

brevicollis, and *O. rectangulus*, applied well to our British examples, and separated them in a satisfactory manner. Thomson's nomenclature, however, would be thought prove untenable, as the distinguished Swede described our common *puncticollis* as a new species under the name of *rectangulus*.

Mr. F. W. Frohawk exhibited a bleached specimen of *Epinephele janira*, having the right fore wing of a creamy white, blending into pale smoky brown at the base; also a long and varied series of *Epinephele hyperanthus*, from the New Forest and Dorking. The specimens from the former locality were considerably darker and more strongly marked than those from the chalk. Amongst the specimens was a variety of the female with large lanceolate markings on the under side, taken in the New Forest in July, 1890, and a female from Dorking with large, clearly defined white-pupilled spots on the upper side. Mr. Frohawk further exhibited drawings of varieties of the pupæ of *E. hyperanthus*, and also a large specimen of a variety of the female of *Euchloë cardamines*, bred from ova obtained in South Cork, with the hind wings of an ochreous-yellow colour. Coloured drawings illustrating the life-history of the specimen in all its stages were also exhibited.

Paper read.

Mr. H. J. Elwes communicated a paper by Mons. Sergé Alphéraky, of St. Petersburg, entitled "On some cases of Dimorphism and Polymorphism among Palæarctic Lepidoptera."

September 2, 1891.

Frederick DuCane Godman, Esq., M.A., F.R.S., President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of Fellows.

Mr. William H. Blaber, of Groombridge, Sussex; Mr. Thomas D. A. Cockerell, F.Z.S., of Kingston, Jamaica; Mr.

Reginald E. V. Hanson, B.A., of Tunbridge Wells, Kent; and Mr. R. C. Wroughton, of Poona, India, were elected Fellows of the Society.

Exhibitions, &c.

Mr. G. F. Scott-Elliot exhibited a series of various species of Diptera collected on *Ranunculaceæ*, *Papaveraceæ*, and *Cruciferæ*. He said that during the past summer he had studied about forty species of plants belonging to the orders named, and that they had *all* been visited by insects which were probably necessary for nectariferous flowers. The majority of the Diptera caught were not confined to one species or even genus, but in view of the unmodified character of the flower in the orders named this was only to be expected. This, however, does not apply to *Fumaria*, to whose scanty list of clients *Pieris* must be added, nor to *Corydalis*, of which the species *claviculata* and *lutea* are abundantly visited by humble-bees. The low character of these orders explains also the absence of any specially interesting adaptations; a twisting outwards of the filaments in some of the *Cruciferæ*, however, has the effect of surrounding the honey-canal by three dehiscing anthers, and in *Crambe* this has resulted in a grooving of the filament and formation of a peculiar hook adapted to this end. Mr. Verrall observed that certain insects affected certain plants, but that the *Geraniaceæ* were seldom visited except by *Empidæ*. The discussion was continued by Mr. M'Lachlan, Mr. Kirby, and others.

Mr. W. L. Distant exhibited a specimen of the orthopterous insect *Hemisaga hastata*, de Sauss, which, in the Transvaal, he observed to attack and feed on *Danais chrysippus*, a butterfly well known from its protective character and distasteful qualities to have a complete immunity from the usual lepidopteral enemies. The *Hemisaga* lurked amongst the tops of tall flowering grasses, being consequently disguised by its protective resemblance to the same, and seized the *Danais* as it settled on the bloom. From close watching and observation Mr. Distant could discover no other danger to the life of this well-known and highly protected butterfly.

Mr. T. R. Billups exhibited some interesting species of Diptera, taken at Oxshott, Surrey, on the 11th July last. He also exhibited a specimen of *Hypoderma bovis*, Deg., taken at Plumstead on the 29th July last.

Dr. D. Sharp exhibited several species of *Forficulidæ*, and called attention to the diverse conditions of the parts representing the wings in the apterous forms.

Mr. H. Goss exhibited living larvæ of *Scoria dealbata*, reared from ova. They were feeding on *Polygonum aviculare*, but not very freely; *Brachypodium sylvaticum* had been named as a food-plant for this species, but he did not find that the larvæ would eat this or any other grass.

The Rev. Dr. Walker exhibited, and read notes on, a collection of Lepidoptera, Hymenoptera, Coleoptera, Neuroptera, and Diptera, which he had recently made near Roldal, in Norway. The collection included the following species:—

Lepidoptera.—*Pieris brassicæ*, *P. rapæ*, *Satyrus mæra*, *Erebia lappona*, *E. ligea*, *E. medusa*, *Cænonympha pamphilus*, *Vanessa cardui*, *V. urticæ*, *Chrysophanus phlæas*, *C. chryseis*, *C. virgaureæ*, *Polyommatus alexis*, *P. argus*, *Argynnis aglaia*, *A. ino*, *A. euphrosyne*, *A. pales*, *Melitæa cinxia*, *Pamphila sylvanus*, *Charæas graminis*, *Caradrina cubicularis*, *Agrotis segetum*, *Apamea fibrosa?*, *Anaitis plagiata*, *Fidonia atomaria*, *F. brunneata*, *Eupithecia* sp.?, *Crambus pascuellus*, *Ptilophorus* sp.?, *Boarmia repandata*.

Hymenoptera.—*Bombus lapponicus*, *B. agrorum*, *B. lucorum*, *B. subterraneus*, *Vespa media*, *Tenthredo mesomela*, *Formica nigra*, *Tenthredo chloros*, *Allantus arcuatus*, *Odynerus pictus*, *O. tristis*, *Megachile centuncularis*, *Ophion luteum*.

Coleoptera.—*Geotrupes stercorarius*, *G. sylvaticus*, *Cetonia ænea*, *Aphodius fossor*, *A. depressus*, *Calathus melanocephalus*, *Nebria olivieri*, *Telephorus obscurus*, *Coccinella septempunctata*, *Carabus violaceus*, *Philonthus æneus?*, *Agriotes aterrimus*, *Pterostichus cupreus*, *Pterostichus* sp. ?, *Chrysomela marginata*, *Silpha rugosa*, *Trichius fasciatus*, *Necrophorus mortuorum*, *Lina ænea*.

Neuroptera.—*Æschna juncea*, *Æ. pratensis*.

Diptera.—*Calliphora vomitoria*, *C. grænlandica*, *Sarcophaga mortuorum*, *Scatophaga stercoraria*, *Musca cæsar*, *Eristalis*

tenax, *E. similis*, *Helophilus frutetorum*, *Olivieria lateralis*, *Sarcophaga hæmorrhoidalis*, *Hæmatopota pluvialis*, *Chrysotoxum fasciolatum ?*, *Empis tessellata*, *Tipula montana*, *Helophilus lunulatus ?*, *Eristalis nemorum*, *Therioplectes auripilus*, *Mesembrina meridiana*, *Volucella bombylans*, *Eristalis* sp. (*? arbustorum*), *Syrphus ribesii*, *Platychirus manicatus*, *Syritta pipiens*, *Rhingia campestris*, *Syrphus* sp. (allied to *corollæ*), *Scatophaga* sp. ♀, *Volucella pellucens*.

October 7, 1891.

Dr. David Sharp, F.R.S., Vice-President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Death of a Fellow.

The Chairman referred to the death, on the 14th September last, of Mr. E. W. Janson, who had been a Member of the Society since 1843, and who had formerly filled the offices of Secretary and Librarian respectively.

Exhibitions, &c.

The Rev. Dr. Walker exhibited a long series of several species of *Erebia*, and of *Argynnis pales*, which he had recently captured near Roldal, in Norway.

Mr. W. L. Distant exhibited specimens of *Danais chrysippus*, with its two varietal forms, *alcippus*, Cram., and *dorippus*, Klug., all which he found together in the Pretoria district of the Transvaal. Mr. Jenner Weir, Colonel Swinhoe, and Mr. Distant took part in the discussion which ensued as to these forms and their distribution.

The Rev. W. F. Johnson sent for exhibition specimens of *Velia currens* from stagnant water near Armagh; also a specimen of *Nabis limbatus*, killed whilst holding on to its prey, a very hard species of Ichneumon. Mr. Saunders thought that, from the nature of the Ichneumon, the only chance the *Nabis* had of reaching its internal juices would be through the anal

opening, as recorded by Mr. E. A. Butler in a similar case, in the Ent. Mo. Mag., Oct. 1891.

Mr. F. P. Pascoe exhibited two British species of Diptera, unnamed. He said they had been submitted to Mr. R. H. Meade, but were unknown to him, and are probably new to the British list.

Mr. R. Adkin exhibited two specimens of a supposed new species of Tortrix (*Tortrix donelana*, Carpenter), bred from larvæ found on pine trees at Tuam. Mr. C. G. Barrett said he had examined the specimens with great care, but he did not consider that they belonged to a new species. He was unable to distinguish them from *Tortrix viburnana*.

Mons. A. Wailly exhibited preserved larvæ, in various stages, of *Citheronia regalis*, which he had bred from ova received from Iowa, United States. He said that the natives call this larva the Hickory Horned Devil, and that the specimens exhibited were probably the first of this splendid species that had been bred in this country. Mons. Wailly further exhibited three female specimens of *Antheræa yamamai* bred from cocoons received from Japan; also a nest of cocoons of *Bombyx radama*, received from the west coast of Madagascar, and a nest of another species, the name of which he had not been able to ascertain. He pointed out that the structure of this nest was different from the nests of *Bombyx radama*, and was attached to the trunks of trees, whereas those of the former species hung from the branches. Prof. J. B. Smith, of the United States, and Colonel Swinhoe took part in a discussion on the habits of the larvæ of *Citheronia regalis*, and as to the period at which they dropped their spines prior to pupating.

Dr. Sharp exhibited several specimens of a weevil, *Ectopsis ferrugalis*, the ends of the elytra of which bore a close resemblance to the section of a twig cut with a sharp knife. He said he had received the specimens from Mr. G. V. Hudson, of Wellington, New Zealand, who stated that they were found resting in large numbers on dead trunks and branches of *Panax arborea* in the forests.

Mr. G. C. Champion stated that the species of *Forficulidæ*, captured by Mr. J. J. Walker, R.N., in Tasmania, and

exhibited by himself at the meeting of the Society in April last, was, he believed, referable to *Anisolabis tasmanica*, Bormans, described in the 'Comptes Rendus' of the Ent. Soc. Belgique, 1880, p. lxviii.

The Rev. A. E. Eaton made some remarks on the synonymy of the *Psychodidæ*, and stated that since August, 1890, he had identified all of the British species in Mr. Verrall's list, except *Sycorax silacea*. He also stated that in Psychoda, *P. bullata*, Hal. MS.=*humeralis*; *P. soleata*, Hal. MS., is a *Pericoma*; and that in Pericoma, *P. fusca*, Macquart, is ♂ of *P. calceata*. Professor Zetterstedt is the only author who refers to the ♂ of *calceata*.

Paper read.

Mr. Gervase F. Mathew, R.N., communicated a paper entitled "The Effect of Change of Climate upon the Emergence of certain species of Lepidoptera." A discussion followed, in which Mr. Stainton, Mr. Barrett, Dr. Sharp, and Mr. M'Lachlan took part.

At the close of the Ordinary Meeting a Special Meeting was held for the purpose of electing a Fellow of the Society to fill the vacancies on the Council, and in the office of Librarian, caused by the death of Mr. Ferdinand Grut. Mr. George C. Champion, having been recommended to fill the vacancies in question, was balloted for, and duly elected a member of the Council, and also Librarian in place of the late Mr. Ferdinand Grut.

November 4, 1891.

Dr. David Sharp, M.A., F.R.S., Vice-President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of a Fellow.

Major John Nathaniel Still, of 4, Westcliff Terrace, Seaton, Devon, and the Junior United Service Club, Charles Street, St. James's, S.W., was elected a Fellow of the Society.

Exhibitions, &c.

Mr. W. F. Kirby exhibited a series of a very dark-coloured form of *Apis* reared by Mr. John Hewett, of Sheffield, from bees imported from Tunis. He said that Mr. Hewett proposed to call them "Punic Bees," and had distributed them under this name, which, if the race be considered sufficiently distinct, might as well be retained for them. They are larger than the black *Apis unicolor*, Latr., of Mauritius and Bourbon, and are almost entirely black, except the legs, which are of a more or less reddish colour; but there is not a trace of red colouring on the base of the abdomen, which is almost invariably the case in typical specimens of *Apis mellifica*, L. Mr. Kirby stated that Mr. Hewett had informed him that these bees are remarkable for their peaceable disposition, and their unwillingness to use their stings; and also for the fact that the workers are much more frequently fertile than those of the common hive-bee, with which, however, these black bees will freely hybridize. He further said that Mr. Hewett had told him that he had made some important original observations on the fertility of workers, which he would be pleased to communicate to the Society.

Mr. C. G. Barrett exhibited five melanic specimens of *Aplecta nebulosa*, reared by Mr. Collins, of Warrington, from larvæ collected in Delamere Forest, Cheshire, and described by him in the 'Proceedings of the Lancashire and Cheshire Natural History Society,' as *A. nebulosa*, var. *Robsoni*, in honour of Mr. John E. Robson, of Hartlepool. Mr. Barrett also exhibited a beautiful variety of *Argynnis aglaia*, taken in Norfolk by Dr. F. D. Wheeler, and two specimens (male and female) of *Lycæna argiades*, taken in August, 1885, on Bloxworth Heath, Dorsetshire, by Mr. C. O. Pickard Cambridge and Mr. A. Pickard Cambridge respectively.

Mr. H. St. John Donnisthorpe exhibited a collection of Coleoptera, made in a London granary in 1890 and 1891. The collection included the following species:—

Sphodrus leucophthalmus, L., *Pristonychus terricola*, Hbst., *Calathus cisteloides*, Pz., *Quedius fulgidus*, Gr., *Q. fuliginosus*, Gr., *Creophilus maxillosus*, L., *Omalium concinnum*, Marsh,

Trogosita mauritanica, L., *Læmophlœus ferrugineus*, Steph., *Silvanus surinamensis*, L., *Cryptophagus saginatus*, Sturm., *C. badius*, Sturm., *Lathridius minutus*, L., *L. ruficollis*, Marsh, *Corticaria fulva*, Com., *Dermestes lardarius*, L., *Attagenus pellio*, L., *Anthrenus musæorum*, L., *Corynetes ruficollis*, F., *Ptinus fur*, L., *Niptus hololeucus*, Fald., *N. crenatus*, F., *Mezium affine*, Boield., *Anobium domesticum*, Four., *A. paniceum*, L., *Rhizopertha pusilla*, F., *Blaps mucronata*, Latr., *B. similis*, Latr., *Tribolium ferrugineum*, F., *Latheticus oryzæ*, Wat., *Tenebrio obscurus*, F., *T. molitor*, L., *Calandra granaria*, L., *C. oryzæ*, L., *Bruchus rufimanus*, Boh.

Mr. A. B. Farn exhibited a series of specimens of *Eubolia lineolata*, bred from eggs laid by a specimen taken at Yarmouth. The series included several remarkable and beautiful varieties, and the size of the specimens was much above the average.

The Rev. Dr. Walker exhibited specimens of *Argynnis ino*, *A. pales*, and *A. frigga*, from Norway.

Mr. B. A. Bower exhibited, for Mr. J. Gardner, specimens of *Nephopteryx splendidella*, H.-S., *Botys lupulinalis*, Clk., and *Bryotropha obscurella*, Hein., taken at Hartlepool last June and August.

Mr. R. Adkin exhibited two very dark specimens of *Peronea cristana*, from the New Forest.

Colonel C. Swinhoe exhibited, and remarked on, types of genera and species of moths belonging to the *Tineina*, all of which had been described by Walker, and placed by him amongst the *Lithosidæ*, *viz.*:—*Betharga lycoides*, Walker, xxxiv, 1154, genus *Sarbena* = *Buxeta*, Walker, xxxv, 1982, sp. *conflagrans*, Walker, type of genus *Sarbena*, xxxi, 256; *Jobula semilinea*, Wk., xxxv, 1889. *Themiscyra conflagrans*, Wkr. = *mactata*, Felder = *verricosa*, Butler.

Mr. H. Goss exhibited specimens of *Callimorpha hera*, taken in August last by Major-General Carden near Teignmouth, South Devon, and observed that the species appeared to be becoming commoner in this country as Gen. Carden had caught seventeen specimens in five days. Mr. Goss said that the object of the exhibition was to ascertain the opinion of the meeting as to the manner in which this species had been

originally introduced into this country. A long discussion on this subject and on the geographical distribution of the species ensued, in which Mr. G. T. Baker, Mr. S. Stevens, Mr. Barrett, Colonel Swinhoe, Mr. M'Lachlan, Mr. Verrall, Capt. H. J. Elwes, Mr. C. Fenn, Mr. M. Jacoby and others took part.

Papers &c., read.

Mr. C. J. Gahan contributed a paper entitled "On South American species of Diabrotica; an Appendix to Parts I. and II."

Mr. M'Lachlan contributed a paper entitled "Descriptions of new species of holophthalmous *Ascalaphidæ*."

Mr. W. L. Distant communicated a paper entitled "Descriptions of four new species of the genus *Fulgora*."

Mr. F. Enock read an interesting paper entitled "Additional notes and observations on the life-history of *Atypus piceus*," which was in continuation of his papers on the same subject read before the Society on May 6th, and June 3rd, 1885.

The author commenced by stating that, besides confirming all his previous observations, he was able to add many facts in the life-history of this interesting spider. With the aid of the oxy-hydrogen lantern, every point and detail were shown in the most realistic manner by pictures on a large screen.

The paper was divided into four parts, *viz.*, the structure of the tube-like nests; the anatomy of the spider; the food supply; and courtship, domestic economy, and tragedy.

The first "picture" was a photograph of six inches of Hampstead Heath, in which small space no less than four or five of the peculiar nests or "purse-webs" of *Atypus* were seen attached to the grassy bank; their resemblance to dead pieces of stick from old gorse bushes, in the vicinity of which the spider makes its nest, was most striking. The structure of the nest showing its silken texture, and the same covered with sand, which the spider brings up from the bottom of the tube, and the ingenious method of attaching the aerial portion to the bank or leaves of plants, afterwards closing the aperture, was fully described. Sectional views of the nest, showing the peculiar cavity made about half-way down and

on the upper side, together with upright and fallen tubes, were thrown on the screen.

The anatomy of the eyes, legs and claws, and the enormous jaws, both of the male and female spider, were shown in comparison with those of *Epëira diadémata*, which have a lateral movement, whereas *Atypus* strikes vertically with its jaws, a wonderful provision, which enables the spider to obtain its food without quitting the tube. The actual movements of the jaws of *Epëira* and *Atypus* were shown on the screen by the author's mechanical arrangements of the lantern. Next followed the internal structure of the jaws, showing the poison-bag and duct, and enormous mass of muscle, attached to the huge fangs; also the labrum and labia with their deadly array of teeth, with which the spider tears a rent just under the impaled fly. The wonderful spinning organs, six in number, were shown in various positions, with their multitude of discharge tubes, through which the never ending silk flows from the internal silk glands, a fine photograph of which was thrown on the screen.

In the third part of his paper, Mr. Enock described the way in which the spider obtained its food without seeing it or quitting the tube. A fly settles on the outside of the aerial part of the nest, setting in motion the long vertical threads, which the spider stretches from top to bottom of the nest; she immediately runs up until she is just underneath the fly, then raising her fangs, and with lightning-like rapidity, strikes them through the tube and into the fly, the labia tear a hole and the fly is dragged through and down to the bottom of the tube, where the spider tackles the fly and pins it to the side, returning to the top again to repair the nest; this she does by carefully drawing the edges together, then reversing her position, she brings the broad spinnerets into position and, with a few movements from side to side, quickly and most securely mends the hole. Each act illustrating the capture of a fly was shown in a most striking manner by the ingenious arrangements adopted by the author; first, the fly was seen on the outside of a sectional view of the aerial part of the tube, followed by the appearance of the spider underneath, the jaws and fangs moved, a moment's pause, and they were brought

down with lightning-like rapidity, driven through the silken walls of the nest and into the thorax of the fly, which was "fiercely held fast"; then came the tug-of-war, and both spider and fly disappeared, but were afterwards shown at the bottom of the tube. The following picture showed the spider mending the hole at the top, and afterwards holding on to the inside with jaws and claws to prevent intruders disturbing her. The male spider was next seen on the outside engaged in performing a serenade to his lady-love, who did not mistake her lover for a fly. The male soon tears a hole in the tube and boldly enters, and dwells with the female for at least six months, after which she kills him, sucks his body dry, and throws his skin out from the top of the tube.

Mr. Enock stated that the female then proceeds to spin a beautiful hammock of eggs, which she hangs up across the cavity prepared for it, and out of all harms way in the upper side of the tube. The eggs soon hatch, and the young spiders are fostered by the mother until the warm days of April induce them to force a small hole in the top of the tube and make their escape. The closing picture, showed a number of these young spiders, some just crawling from the hole, others hanging and enjoying a swing, several had ascended to the highest points and ejected a few threads, which were quickly caught by the wind, which in a short time wafted the tiny aeronauts to pastures fresh and new; others had commenced life on their own account, by forming minute purse-webs or tubes similar in every respect to the one from which they had escaped but a few hours before. A discussion followed, in which Dr. Sharp, Mr. C. O. Waterhouse, Mr. G. C. Champion, the Rev. A. E. Eaton, Mr. P. Crowley, and others took part.

December 2, 1891.

The Right Hon. Lord Walsingham, M.A., LL.D., F.R.S., Vice-President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of Fellows.

Mr. Henry A. Hill, of 132, Haverstock Hill, Hampstead, N.W.; Mr. Frank Nelson Pierce, of 143, Smithdown Lane, Liverpool; and Mr. Carleton F. Tuffnell, of Greenlands, Border Crescent, Sydenham, S.E., were elected Fellows of the Society.

Exhibitions, &c.

Dr. D. Sharp exhibited and commented on a number of photographs of various species of *Lucanidæ* belonging to Mons. René Oberthür.

Mr. C. G. Barrett exhibited specimens of local forms and varieties of Lepidoptera, taken by Mr. Percy Russ, near Sligo, including *Pieris napi*, var. near *bryoniæ; Anthocharis cardamines* (male), with the orange blotch edged with yellow, and yellowish forms of the female of the same species; very blue forms of *Polyommatus alsus;* males of *P. alexis*, with the hind margin of the under wings spotted with black, and very handsome forms of the female; also varied series of *Agrotis cursoria*, *A. tritici*, *A. valligera*, *Hydræcia micacea*, *H. nictitans*, *Epunda lutulenta*, *Hadena protea*, *Odontoptera bidentata*, *Cidaria immanata*, *C. testata*, *C. pyraliata*, and *Boarmia repandata*.

The Rev. S. St. John exhibited two specimens of *Lycæna argiades*, taken in Somersetshire by Dr. Marsh in 1884; three specimens of *Deilephila euphorbiæ*, bred from larvæ found feeding on *Euphorbia paralias* on the Cornish coast in September, 1889; and a series of various forms of *Anchocelis pistacina*, all taken in a garden at Arundel. Lord Walsingham, Mr. Barrett, and Mr. McLachlan took part in the discussion which ensued.

Mr. Jenner Weir exhibited two dusky specimens (♂ and ♀) of *Zygæna minos*, which had been captured by Mr. Blagg in Carnarvonshire. In these specimens the upper, and in a less degree the lower, wings were much suffused with black, and but faint red markings were visible. Mr. Weir said they were not absolutely cases of complete melanism, but he suggested that that the word "phæism"—from φαιός, dusky—would be a correct word to use in this and similar departures

from the euchromatic or normal coloration of a species. Mr. Weir observed that the summer of 1891 had been an unusually cold one—indeed, it could scarcely be termed a summer; and these very dusky specimens supported Mr. Merrifield's theory that the application of cold for a few days prior to the emergence of the imago tended to produce that result.

Mr. C. J. Gahan exhibited a specimen of the common "book-louse" (*Atropos pulsatoria*, Fabr.), a minute insect of the order Neuroptera, and made some remarks concerning the curious noises known by the name of the "death-watch." It was a well-ascertained fact, he said, that sounds of this kind were caused by different beetles of the genus *Anobium*; but that, notwithstanding the very strong circumstantial evidence detailed by a few observers who traced similar sounds to the action of *Atropos pulsatoria*, much doubt has been entertained by some eminent entomologists that this little soft-bodied creature could possibly produce sounds, audible, at a distance, to human ears. Two recent observations had convinced him, he stated, that some of these sounds were to be attributed to this insect. At about half-past eleven o'clock on a night in October last, when the room in which he was sitting was still, he distinctly heard the "death-watch." Listening awhile, he found that the sound proceeded from a wide-mouthed earthen vase standing near the end of a marble mantel-piece. The sound, which consisted of rapid beats in regular succession, lasted for a space of nearly a minute, and was repeated at short intervals. When he proceeded to carefully remove the vase to a table the sound ceased. He then emptied the vase of its contents—an ordinary chip match-box, containing a few small beetles gummed on a piece of card. In the match-box he found a single specimen of *Atropos pulsatoria*, the only living thing that could possibly have been in, or close to, the jar at the time the sound was heard; so that it was impossible for him to resist the conclusion that the sound was caused by this insect. To put the matter to a further test, he secured the insect in a chip pill-box with a close fitting cover, in the hope of hearing it repeat its performance. Though he had listened

at different times since, he had heard no sound come from that pill-box. Last night, however, he again heard the "death-watch," and, on bringing his ear close to the pill-box, was surprised to find that the sound came from another quarter. He followed up the sounds, and was satisfied that they came from a little wooden box, in which some beetles were pinned, and which stood on the topmost shelf of an overmantel. The sole living occupant of the box was *Atropos pulsatoria*, possibly the same individual which was previously heard, for the pill-box, on examination, proved to be empty. As the result of his observations, Mr. Gahan said that he felt quite convinced that *Atropos pulsatoria*, in spite of its diminutive size and the softness of its body, is capable of producing sounds, distinctly audible at a distance of more than two yards, but that in what manner it produces the sound he was unable to ascertain.

Mr. B. A. Bower exhibited the following rare species of Micro-Lepidoptera :— *Spilonota pauperana*, Frol. ; *Gelechia osseella*, Stn. ; *Chrysoclysta bimaculella*, Haw. ; and *Elachista cingilella*, Fisch. Lord Walsingham and Mr. Tutt made some remarks on the specimens.

Mr. R. Adkin exhibited a variety of *Anthocharis cardamines*, and one *Sesia scoliæformis* bred from a larva found at Rannoch.

Papers, &c., read.

Mr. G. T. Baker read a paper entitled "Notes on *Lycæna* (recte *Thecla*) *rhymnus*, *tengstræmii*, and *pretiosa*." A discussion followed, in which Lord Walsingham, Mr. Elwes, and Mr. Baker took part.

Mr. F. Merrifield read a paper entitled "The effects of artificial temperature on the colouring of *Vanessa urticæ* and certain other species of Lepidoptera." The author stated that he had already proved that the colouring of *Selenia illustraria*, in both the spring and summer emergences, and the colouring of *Ennomos autumnaria*, were materially affected by the temperature to which the pupa was exposed in its penultimate stage—that is, the stage immediately preceding the one in which colour begins to show externally—intensity and darkness of colouring being promoted by the lower

temperature. He had now ascertained that precisely similar effects were produced on both the spring and summer emergences of *Selenia illunaria* and *S. lunaria*. Several hundred individuals, belonging to more than a dozen different "families," *i. e.*, proceeding from the same pair of parents, exposed to temperatures of 80°, 60°, 57°, and in some cases less, all showed these results, those at the lower temperatures, with scarcely an exception, being darker than those at the higher. The spring emergence of *Platypteryx falcataria*, so far as tried, showed similar results. The under sides of the Selenias showed these effects even more than the upper sides, the males, in most species tried, more than the females, and the more healthy and vigorous the individual, the more strongly the temperature operated. In *Vanessa urticæ* the same general results ensued, though the effects were not so considerable. In this species a moderately low temperature, 50° to 60°, appeared to develop the greatest intensity of markings, especially of the dark parts and the blue crescents, a very low temperature, 47°, long continued, causing a more general increase of darkness. Some of the specimens produced made a near approach to the northern form known as var. *polaris*. *Bombyx quercus* and its northern var. *callunæ* had been experimented on, and showed slighter results in the same direction. Further experiments were needed as to both *V. urticæ* and *B. quercus*, and he was inclined to think they should be exposed from their earliest pupal existence. *Chelonia caja* showed unquestionable differences as the result of temperature, but not to the extent of producing any striking varieties ; the higher temperature caused the ground of the fore wings to be lighter, and that of the hind wings to be yellower, and the lower temperature caused a tendency in the dark spots to spread and become confluent, and especially increased in a striking degree both the length and the breadth of the black abdominal bars. There was evidence that the size and probably the shape of the perfect insect were affected by the pupal temperature, but exact experiments had to be made on this point, and were in progress. On the suggestion of members of the Society he had tried the effects of light, by exposing the pupæ of *S. illustraria* to light of various colours

and to absolute darkness, but had not been able to obtain any results from the experiment. Many more experiments, and on many more species belonging to widely-separated families among the Lepidoptera, should be tried before sufficient materials could be accumulated for a satisfactory explanation of these temperature effects ; but in the meantime he ventured to suggest that some of them were due to the circumstance that a particular temperature was more suitable to health and vigour than any other was, and tended consequently to produce larger size and greater intensity of colouring and markings ; but that this would only account for a small part of the effects produced, especially in the seasonally dimorphic species ; and in those he had operated on there seemed to be what in the absence of further knowledge might be called a direct tendency in a low temperature to cause darkness of markings. Mr. Merrifield exhibited a large number of examples of the temperature effects produced, many of which were very striking, and said they would be left for inspection for some time at the Natural History Museum, South Kensington.

Mr. E. B. Poulton desired to congratulate Mr. Merrifield on the results of his work. He had quite thought that Mr. Merrifield was right in his earlier conclusion that the results obtained were due to temperature and not colour, as had been suggested. In addition to Mr. Merrifield's convincing demonstration that colour is not concerned, Mr. Poulton wished to add that he had, during the past season, tested the moth which is more likely to yield positive evidence on this point than any other, viz., *Gnophos obscurata*, the imago of which is well known to be light upon chalk and dark upon peat. In spite of this Mr. Poulton had found that when the mature larvæ and the pupæ are subjected to light or to dark surroundings, no change is produced in the imagines. So far as the evidence goes at present, it is probable that the facts are explicable by the operation of natural selection, the light varieties occurring in places where the dark ones are more conspicuous and therefore exterminated, and *vice versâ*.

Prof. Meldola said that it appeared to him that on the whole Mr. Merrifield's results gave support to Professor

Weismann's original theory, *viz.*, that the effect of refrigeration was to bring about reversion to the ancestral glacial form. But apart from any theoretical considerations, he considered that Mr. Merrifield was to be congratulated on the important contribution to the knowledge of the effects of temperature on lepidopterous pupæ, which he had been enabled to make by means of the carefully conducted series of experiments carried on for several years, and the results of which had been from time to time communicated to the Society. Prof. Meldola further remarked that he was particularly interested in the way in which Mr. Merrifield had eliminated the effects of light, and had shown, as he thought conclusively, that the effects were due to temperature alone. He (Prof. Meldola) had always been of opinion that light had nothing to do with the observed modifications of colour. With reference to Lord Walsingham's remarks concerning the possible action of the ultra-violet rays in affecting the chemical processes concerned in the production of pigment, Prof. Meldola pointed out that the notion that some specially active chemical force existed in this part of the spectrum had long been abandoned. Any part of the spectrum might be chemically active; it depended on the absorbtive power of the substance for the particular rays.

Mr. C. G. Barrett referred to experiments performed some twenty years since by confining larvæ under coloured glasses, which, however, had produced no effect.

Mr. Jenner Weir said he had seen Mr. Merrifield's long series by daylight, which made the change of colouring produced even more conspicuous.

Lord Walsingham said that he thought some of the negative results valuable, and expressed the thanks of the meeting to the author of the paper.

Mr. Merrifield said his results seemed barely consistent with Weismann's proposition that, though the summer form could be made to assume the appearance of the winter form, the converse was not the case. But Prof. Weismann's theory was that the change of temperature operated by causing reversion to an ancestral form, and, as every individual of a seasonally dimorphous species had two lines of ancestry, it

struck him as possible that suitable conditions might cause reversion to either of these; so that the results obtained by him might not be inconsistent with the Weismann theory in its essence. He would not, however, venture to form an opinion how the temperature operated; he should be inclined to say that it produced some effects which provisionally, and in the absence of further knowledge, might be called direct.

Mr. W. Bateson read a paper entitled "On the variation in the colour of the cocoons of *Eriogaster lanestris* and *Saturnia carpini*," and exhibited a large number of specimens in illustration of the paper.

Lord Walsingham congratulated Mr. Bateson on his paper, and on the intelligent care and method shown in his experiments, and said that he was glad to see that at Cambridge there was an entomologist ready to enter this interesting field of investigation, and perhaps at some future day to contest the palm with Mr. Poulton as representing the sister University of Oxford. He had noticed that the larvæ of *S. carpini*, if left in a box with dead food, and probably partially starved, made a light-coloured cocoon; but that when the cocoon was made under natural conditions, on living food-plants on the moors, it was of a dark colour.

Mr. Poulton said he was glad to take the opportunity of admitting that Mr. Bateson had made out a strong case, especially with *Eriogaster lanestris*, and he congratulated him on his results. Mr. Poulton regretted that most of the observations which had led him to the conclusion that the colour of certain cocoons can be adapted to the tints of the environment had been made by others, inasmuch as he was thus less acquainted with the details. The evidence from *E. lanestris*, which at first appeared so strong, was much weakened when Rev. W. J. H. Newman subsequently stated that the white paper boxes in which the white cocoons were formed had been placed in a dark cupboard for at any rate a large part of the time of building. At the same time, if Mr. Bateson's interpretation be accepted, it is remarkable that about one-third of his larvæ, which sought the paper voluntarily and undisturbed, should have formed light cocoons, when we remember that undisturbed larvæ invariably construct dark cocoons

upon the stem and leaves of their food-plant. Mr. Poulton said that he had also found that dark cocoons may be formed in spite of the excessive disturbance caused by an investigation into the mode of construction. Mr. Bateson's results, if due to disturbance, are not *necessarily* destructive of the conclusions previously arrived at. The glittering pupæ of *Vanessidæ* may be produced, in healthy individuals, by exposing the mature larvæ to white or gilt surroundings, but they are also caused by the presence of parasites. In the case of *E. lanestris* it must be freely admitted that Mr. Bateson's results prove that the evidence previously relied upon is insufficient, and further indicate that, if the species is sensitive to the colour of its surroundings in the manner hitherto assumed, its susceptibility is not nearly so great as was supposed. Further experiments must show whether any trace of susceptibility to colour exists.

Mr. Poulton further stated that in such experiments upon this and other species it would be well to test Mr. Bateson's suggestion by frequently disturbing and insufficiently feeding larvæ, which are then allowed to spin on the food-plant; furthermore, in the case of colours, it would be advisable to employ more natural backgrounds than paper, muslin, &c. Earth, sand, peat, chalk, coal, leaves and twigs of various tints and shades, might be used. It must also be admitted that the evidence in the case of *Halias prasinana*, *Liparis auriflua*, and *Rumia cratægata*, which appeared sufficient when Mr. Newman's results with *E. lanestris* seemed to be convincing, is now inadequate, and new experiments, upon a far larger scale, must be conducted. Mr. Poulton thought that in the case of *Saturnia carpini*, Mr. Bateson's evidence is weaker, and that which supports the earlier conclusions stronger, than in the case of *E. lanestris*. At the same time, it is by no means impossible that starvation or extreme disturbance may tend to produce light cocoons, even if these are also caused by light surroundings. The harmony between the colour of these cocoons and their surroundings had been observed by many naturalists. Mr. Poulton remarked that Mr. A. R. Wallace alluded to it in 'Tropical Nature,' and that Mr. W. H. Harwood, of Colchester, had called his

attention to it in 1886; and he thought it extremely improbable that he had specially disturbed the larvæ which spun the light cocoons. In his (Mr. Poulton's) experiments this was certainly not the case, and the larvæ were not even removed from the cage, but spun upon a white plate beneath the food-plant. Dr. F. A. Dixey has obtained the same results, and he maintains that his larvæ were removed to white paper with a minimum of disturbance. Mr. Poulton stated that neither he nor Dr. Dixey experienced the difficulty in obtaining large numbers of dark cocoons of this species, which seemed to have beset Mr. Bateson during the past season.

In conclusion, Mr. Poulton said he trusted that before this time next year he would either be able to admit that he had been altogether mistaken, or bring before them—as the result of his own work and that of others—such evidence as would form a secure foundation for the conclusions at which he had previously arrived.

ANNUAL MEETING.

January 27th,* 1892.

Frederick Du Cane Godman, Esq., F.R.S., President, in the chair.

An Abstract of the Treasurer's Accounts was read by Mr. C. G. Barrett, one of the Auditors.

Mr. H. Goss, one of the Secretaries, read the following :—

Report of the Council.

In accordance with the Bye-Laws, the Council begs leave to present the following Report :—

During the year 1891 six Fellows have died, *viz.*, Mons. Edmond André, the Duke of Devonshire, K.G., F.R.S., Mr. Ferdinand Grut, F.L.S., Mr. Edward Janson, Mr. J.

* Adjourned from the 20th January, in consequence of the death of H.R.H. the Duke of Clarence and Avondale.

W. Peers, and Mr. W. E. Poole; eleven Fellows have resigned; six Fellows have been struck out of the list for non-payment of their subscriptions; and 27 new Fellows have been elected.

The number of Fellows elected during the year is equal to the number elected in 1890, and with the exception of that year and 1886 (in which latter year the number was greatly augmented by the conversion of Subscribers into Fellows), is the largest on record. On the other hand, the number of deaths, exclusions, and resignations has been unusually large, and notwithstanding the number of new Fellows elected, the Society's list has only increased by *four* since the date of the last Annual Meeting! The yearly increase in the number of Fellows being so small, the Council is still obliged to refuse or postpone the publication of valuable papers and plates for want of funds, and therefore it feels again bound to urge the Fellows to do their utmost to induce their friends to join the Society and thus increase its revenue.

At the present time the Society consists of an Hon. Life-President, 10 Honorary Fellows, 48 Life Fellows, and 281 paying the Annual Subscription, making the total number of Fellows now on the Society's List 339.

The Transactions for the year 1891 form a volume of 524 pages, containing 24 memoirs contributed by the following 19 authors, *viz.*, Mr. George T. Bethune Baker, F.L.S. (2 papers); the Rev. Thomas A. Marshall, M.A.; the Right Honble. Lord Walsingham, LL.D., F.R.S.; Colonel Charles Swinhoe, F.L.S. (2 papers); Mr. Frederic Merrifield; Mr. Roland Trimen, F.R.S.; Mr. Hamilton H. Druce; Mr. Henry W. Bates, F.R.S.; Mr. William F. Kirby, F.L.S. (2 papers); Dr. David Sharp, F.R.S.; Mr. Frederick Enock; Mr. Charles J. Gahan, M.A. (3 papers); Mr. George C. Champion, F.Z.S.; Mr. Philip Crowley, F.L.S.; Professor J. O. Westwood, M.A.; Mons. Sergé Alphéraky; Mr. Gervase F. Mathew, R.N., F.L.S.; Mr. Robert McLachlan, F.R.S.; and Mr. William L. Distant. Only three of these papers, *viz.*, those by the Rev. T. A. Marshall, Mr. Merrifield, and Mr. Enock, were devoted to British insects.

Of these 24 papers 12 relate to Lepidoptera (or to enquiries

in which Lepidoptera were the subjects of experiment), 6 to Coleoptera, 1 to Hymenoptera, 1 to Neuroptera, 1 to Orthoptera, 2 to Hemiptera, and 1 to Diptera.

The memoirs above referred to are illustrated with 20 plates, of which 17 are coloured.

The Society is indebted to Lord Walsingham for the entire cost of Plates III., IV., V., VI., and VII.; to Mr. Merrifield for half the cost of Plate IX.; to Mr. F. D. Godman for the entire cost of Plates X., XI., XIII., and XIV.; and to Mr. Crowley for the entire cost of Plate XVIII.

The Proceedings, containing an account of the exhibitions and discussions at the Meetings, extend to over 40 pages.

The financial position of the Society is satisfactory. The Subscriptions for 1891 received during the year amount to £287 as against £268 for 1890, and the amount received for sale of publications amounted to £95 in 1891 as against only £71 in the preceding year.

The amount expended for printing and plates amounts to £318 for 1891 as against £291 for 1890, notwithstanding the great liberality of some of our Fellows, who have generously assisted the Society by defraying the cost, or part of the cost, of certain plates, as noticed above. Three Life-Compositions in lieu of Annual Subscriptions have been received during the year. Of these one remains unappropriated, and forms part of the balance at the Bankers at the end of the financial year; one has been devoted to bookbinding, which necessary matter had fallen somewhat into arrear; and the third has been invested, producing £16 8s. 1d. Consols. The investments now amount to £427 19s. 3d. Consols (cost £408 13s.).

During the past year nearly 200 Books, Pamphlets, Journals, and Papers have been added to the Library; the average number of Fellows attending the Meetings is far greater than in any previous year of the Society's existence, and the Council considers it has reason to congratulate the Fellows on the progress made by the Society during the year 1891.

The following is an Abstract of the Receipts and Payments during 1891:—

Receipts.	£	s.	d.
Balance in hand 1st Jan., 1891 - -	2	7	11
Contributions of Fellows (including £12 12s. in advance) -	411	8	9
Sale of Publications -	95	15	11
Donations - - -	32	0	8
Interest on Consols -	11	1	0
	£552	14	3

Payments.	£	s.	d.
Rent, Salary, and Office Expenses - - -	159	12	1
Printing - - -	200	2	9
Plates, &c. - - -	118	3	5
Books and Binding -	18	8	3
Investment - - -	15	15	0
Subscriptions repaid -	3	3	0
„ in advance	12	12	0
Balance - - -	24	17	9
	£552	14	3

11, Chandos Street, Cavendish Square, W.
January 27th, 1892.

The Secretaries not having received any notice proposing to substitute other names for those contained in the lists prepared by the Council, the following Fellows constitute the Council for 1892:—Charles G. Barrett; George C. Champion, F.Z.S.; Herbert Druce, F.L.S.; Henry John Elwes, F.L.S.; the Rev. Canon Fowler, M.A., F.L.S.; Frederick D. Godman, F.R.S.; Herbert Goss, F.L.S.; Robert McLachlan, F.R.S.; Prof. Raphael Meldola, F.R.S.; Edward B. Poulton, M.A., F.R.S.; Dr. David Sharp, M.A., F.R.S.; Colonel Charles Swinhoe, F.L.S.; and the Right Hon. Lord Walsingham, M.A., LL.D., F.R.S.

The following are the Officers elected:—*President*, Mr. Frederick Du Cane Godman; *Treasurer*, Mr. R. McLachlan; *Secretaries*, Mr. Herbert Goss and the Rev. Canon Fowler; *Librarian*, Mr. George C. Champion.

Mr. F. D. Godman, the President, then delivered an Address, at the conclusion of which Lord Walsingham proposed a vote of thanks to Mr. F. D. Godman for his services as President during the year, and for his Address.

The proposal was seconded by Mr. E. B. Poulton, and carried unanimously.

A vote of thanks to the Treasurer, Secretaries, and Librarian was moved by Mr. G. H. Verrall, seconded by Mr. C. G. Barrett, and carried unanimously.

Mr. Godman, Mr. McLachlan, Mr. Goss, and Mr. Champion severally replied.

ENTOMOLOGICAL SOCIETY OF LONDON.

Balance Sheet for the Year 1891.

Receipts.	£	s.	d.
Balance, Jan. 1st, 1891	2	7	11
Subscriptions for 1891	287	10	9
Do. in advance	12	12	0
Arrears	9	9	0
Life Compositions	47	5	0
Admission Fees	54	12	0
Interest on Investments	11	1	0
Sale of Publications	95	15	11
Donations	32	0	8
	£552	14	3

Payments.	£	s.	d.
Printing	200	2	9
Plates and Woodcuts	118	3	5
Rent, Salary, and Office Expenses	159	12	1
Books and Binding	18	8	3
Investment (cost of £16 8*s.* 1*d.* Consols)	15	15	0
Subscriptions repaid (paid in error)	3	3	0
Subscriptions in advance (per contra)	12	12	0
Balance, Dec. 31st, 1891	24	17	9
	£552	14	3

ASSETS.

Subscriptions in arrear (considered good), £6 6*s.* 0*d.*

Investments:—

Cost of £427 19*s.* 3*d.* Consols = £408 18*s.* 0*d.*

LIABILITIES.

(Nil.)

Robert McLachlan,
Treasurer.

Examined and found correct,

Samuel Stevens.
Herbert Druce.
Charles G. Barrett.

12th January, 1892.

THE PRESIDENT'S ADDRESS.*

Gentlemen,

If an apology for the shortcomings of his Address to you is ever necessary from your President, it is especially so from the present occupant of this chair. So far as Entomology is concerned, I am already in the position of one of your future members, whom Lord Walsingham, in his Address to you two years ago, described as having so specialised his work that he could not venture to call himself by so general a term as an entomologist, but rather a Pieridist or Hispidist. At the present moment I am little more than an Hesperiidist, and I think my work is cut out for me for some time to come. The study of this most obscure and difficult family of Lepidoptera does not furnish material for a Presidential Address, and yet the work to be done to reduce even the Mexican and Central American species to order is so exacting that with other occupations no time is left me to look right or left beyond the limits of my task.

I am reduced therefore to saying a very few words to you on a subject which has already occupied to some extent the recent Addresses of both Dr. Sharp and Lord Walsingham. I refer (1) to the acquisition of fresh entomological materials in the shape of collections, (2) to their examination, and (3) their ultimate disposal.

In estimating the probable number of existing species of insects, Dr. Sharp arrived at the formidable total of 2,000,000, and Lord Walsingham was disposed to look upon this figure as probably not too high. As our present knowledge extends to about 200,000 species, there remain 1,800,000 yet un-

* In consequence of the death of H.R.H. the Duke of Clarence, the Annual Meeting was adjourned *from* the 20th *to* the 27th January, 1892.

described, of which probably 100,000 are represented by unnamed specimens in our collections; the rest await discovery. The acquisition of fresh materials from collections therefore is not likely to slacken for a long time to come; indeed, when the taste for the study of more showy forms changes for one that will comprehend the less bright and smaller but not less interesting ones, it is certain that new species will pour in upon us at a higher rate than ever. In spite of this increase of work the harvest that reaches us now, so far as my own experience goes, is greater than our workers can deal with, and had we a few more such ardent collectors as, say, Mr. Champion or Mr. Herbert H. Smith at work in the tropics, the stock of our visible unworked materials would largely increase in quantity. Any one who has attempted to bring together anything like a complete collection of the fauna of a country, however small, has experienced the difficulties that have met me in the attempt to gather together all available information on the fauna of Mexico and Central America, and of certain small islands of the West Indian Archipelago. In the former case, owing to the cordial assistance afforded by many very competent workers, considerable progress has been made, but still more help is wanted to work out several very interesting orders, the collections of which look inviting enough, and doubtless teem with novelties. Regarding the West Indian work, in which Dr. Sharp has taken a very active interest, I fear the Mexican and Central American task has stood somewhat in the way, and we have had to search the continents of Europe and North America to find volunteers to examine the collections formed by Mr. H. H. Smith in the small island of St. Vincent, and similar collections from the island of Grenada are still untouched. From this it is evident we have not workers enough even now to keep pace with the requirements of naming and arranging the specimens that come before us, and unless our numbers largely increase the arrears of work will become more and more unmanageable. Is, then, the number of workers increasing? I mean the workers at the great mass of exotic species chiefly crowded in the tropical and semitropical countries.

Judging from the number of titles of papers given in the yearly volumes of the 'Zoological Record,' it would certainly appear that more entomological work is being done; but I have some doubts whether the particular subjects to which I now refer, *viz.*, the naming and classification of unnamed species, are receiving the increased attention requisite to render an approximate knowledge of Insecta generally possible within a reasonable time. But it is not my object now to review past work, but rather to examine the effect of the altered and altering conditions of our collections upon working entomologists, and to see whether those conditions can be so modified as to increase the number of workers, and to render their labours as accessible as possible to all.

Working entomologists, apart from field workers, may be divided, for my present purpose, into two classes, *viz.*, those who are connected with our museums and make the subject their profession, and those who are not so employed, but who pursue Entomology at such times as they can spare from their regular business of life. It is the latter, being the more numerous body, who have contributed much more extensively to our present stock of entomological knowledge. Their work has been chiefly based upon their private collections, formed partly from old sources, and partly from new materials often collected by themselves, or brought by field naturalists from all parts of the world. These collections hardly ever have any permanent resting place in private hands; very seldom indeed does a son take up the work of his father; they either change hands, are dispersed, or become—their happiest fate—absorbed in a public museum. This system, which has gradually grown up, is, I think, likely to change, as the extent of collections is, under modern requirements, largely on the increase. This growth of collections renders the subject studied far more complicated, and the difficulty is likely to increase tenfold. The effect is already plainly visible, for private collections are becoming rapidly absorbed by museums, or by a much smaller number of private collectors, with whom they can only temporarily remain. This absorption of private collections by public museums is likely to continue as regards Entomology, as it has in other

subjects. It certainly has done so with plants, as now hardly a private herbarium exists in this country—nearly all have been absorbed by Kew. So also with birds ; a large portion of the private collections of a few years ago are now being concentrated in the British and other museums.

What, then, will be the effect of this concentration of collections in public museums on the number of working systematic entomologists other than the Museum officials ? Under existing circumstances I am inclined to think the number will decrease. The necessity at the present time of examining large series of specimens of any species from as wide a range of localities as possible so that the variation and distribution of the species can be traced, has increased the bulk of collections to an enormous extent. In former times a pair or two of a species was considered enough to represent it in a collection, but now we find that 40 or 50 or even 100 specimens are necessary to show the stability or instability of a species, its range, and all the many points connected with a satisfactory comprehension of its limits. All this vastly increases the cost of forming and preserving new collections, and is against the private collector undertaking the task, and the burden of the work of determining and classifying will be more and more thrown upon the Museum officials. That the number of private workers at systematic Entomology should decrease is distinctly to be deplored, and in view of the tendency of collections to become amassed in museums, it follows that it is chiefly to the arrangements made in those museums that this evil is to be arrested.

As we all know, when once a specimen becomes the property of the Trustees of the British Museum, it must never pass out of their possession. Nothing, then, can be seen out of the Museum hours, and entomologists who have their daily business to attend to can only visit the Museum at rare intervals. They do this to a great extent now in order to determine specimens in their own collections ; but when the latter are, from reasons already given, no longer made, the subject will cease to be studied by them. I am inclined to think this can be obviated to a great extent in a way that will greatly benefit the Museum and all concerned. There are, no doubt,

a considerable number of specimens, such as types, &c., which, on account of their special value, should never leave the Museum under any circumstances; they are too valuable to be placed in any risk of loss. Besides these, there is by far the greater part of the Museum collection which falls into a different category. I refer to specimens which are either unnamed (a very large number), or, if named, are not types, and which in their existing state do not possess any special scientific value, not having had any work bestowed upon them. All such specimens could, at a very slight risk, be entrusted to competent specialists not officially connected with the Museum to be named and prepared either for incorporation into the Museum series or assigned to the named duplicates for future distribution to other institutions. No doubt additional work would be necessary on the part of the Museum officials in preparing such series for examination; but this labour would be more than counterbalanced by the work performed upon the specimens when they are returned named into the Museum, and ready for incorporation into the general collection.

The extent of the subject of Entomology is so vast that nothing but a systematic and continuous effort to amass collections, work them out, and preserve them, can place us in a position to proceed safely with the larger questions which follow the initial step of naming species; and it will only be by the steady effort of our Museum officials, not only to work at the subject themselves, but to enlist the aid of every available outside worker, that real substantial progress can be made. The talents of the outside public can only be fully used by a system by which specimens can be placed in the charge of any competent worker to be determined by him at his own home, and at his leisure, for a certain definite time, and under well understood rules. The benefit to the Museum collections under a system of this kind is obvious. The great mass of unnamed materials, which, we believe, now exists in the Museum, would be gradually worked into order; and, on the other hand, the inducement of having a good series of specimens to work at, and in a way that suits the circumstances of the outside workers, will certainly tend

to increase their numbers to the great benefit of the study of Entomology.

As a practical illustration of the working of such a system as this, I will instance what has been going on for the last twelve years with reference to the Mexican and Central American collections now in process of being worked out. A few groups have been studied at home, but by far the larger portion of our material has been placed in the hands of various workers both at home and abroad. These collections go out and are returned without loss, and the result at present is that nearly 19,000 species of insects have been fully determined, and a series reserved and arranged for future reference. I have not been able to ascertain the number of specimens representing these 19,000 species, but the total is very large. If I may hazard a conjecture, I should say that I should not be surprised if the number reached 250,000.

During the past year the Society has lost six Fellows by death :—

The Duke of Devonshire, who died on the 21st December last, at the advanced age of 83, joined our Society in 1837. Though he did not take an active part in promoting the study of Entomology, our Society, as well as many others, shared the support he so freely gave to all scientific bodies.

Edward Wesley Janson died on the 14th of September last, in the seventieth year of his age. He showed a taste for natural history pursuits at an early age, and though educated at first for the medical profession, he for some time assisted his father as a city merchant, and afterwards as Secretary of the Dutch Rhenish Railway. In 1867, on the death of his father, he relinquished all other pursuits, and commenced business as a Bookseller and Natural History Agent, for which his tastes well qualified him. His special study was Coleoptera, and he was not only a successful collector of beetles, but his energy at one time did much to reduce to order the British species then much less known than now. He also amassed collections of other groups of beetles, the chief of which was the family of *Elateridæ*, his collection, in

which he retained his interest to the last, being by far the most extensive ever got together. Mr. Janson, though well versed in entomological literature, and possessing a very valuable library, was not a voluminous writer, his chief contributions to science being upon matters connected with British Coleoptera. At one time he was closely connected with the administration of this Society, which he joined in 1843. From 1850 to 1863 he held the post of Curator of the collections then possessed by the Society, and was Librarian until 1874. He was also one of the Secretaries from 1857 to 1861. His collection of British Coleoptera passed, I believe, some years ago into the possession of his intimate friend G. R. Crotch, and was bequeathed by him to the University of Cambridge. His collection of *Elateridæ*, in which he took such pride, will pass eventually into the British Museum.

Ferdinand Grut, our late Honorary Librarian, died, to the great regret of us all, on July 19th of last year. He joined the Society in 1846, acted as one of our Secretaries from 1871 to 1878, when he undertook the duties of Honorary Librarian, and continued in that office until his death. His chief study was Coleoptera, and especially the Geodephaga, of which he possessed an extensive collection. As Librarian, Mr. Grut was very well known to us all, and his patient, unfailing attention to his duties will long be remembered. The want of a printed catalogue of our books has long been felt, and some time ago it was determined that such a catalogue should be prepared. This arduous task Mr. Grut undertook to perform, and he had, I believe, made some progress with the MS., when his work was interrupted by illness, and finally arrested by his death. This catalogue, it is to be hoped, may some day be completed.

Edmond André, whose death was recorded last year, joined our Society in 1880. He lived at Beaune (Côte d'Or), and carried on the business of an Entomological Bookseller and General Natural History Agent. At the same time he worked assiduously at Hymenoptera, and published many papers and notes on this subject. His chief work was "Species des Hymenoptères d'Europe et d'Algérie," commenced in 1879,

and continued, with the aid of fellow-workers on the same subject, until his death. It is to be hoped that this important work will be continued by some other competent hymenopterist, and brought to a conclusion.

William Ebenezer Poole, who died on May 22nd last, at the age of 65, was well known to all of us who are in the habit of using our Library and attending our Meetings. He acted as Resident Librarian from the time we occupied our present rooms, and continued in that office until his death. He joined the Society as a member in 1885.

We have also lost John Witherington Peers, who joined us in 1887.

Of entomologists not connected with the Society, who have died during 1891, I find the following well-known names :—

Felipe Poey, who died at Havana, the place of his birth, at the advanced age of 92, devoted a large portion of his life to the study of Natural History of his native island, Cuba. His principal work was on Ichthyology, but he wrote several papers on the Lepidoptera of Cuba, and studied other orders of insects of that island.

Sir William Macleay, whose death was recently announced, though not a member of our Society, was a liberal patron of Natural History in Australia. He belonged to the same family as William Sharp Macleay, the contemporary of Horsfield and Swainson, so well known for his writings. Sir William Macleay settled in New South Wales in 1839 at the age of 19, and gradually rose to distinction in the Colony. He was the founder and first President of the Entomological Society of New South Wales, and of the Linnean Society of New South Wales, and in the publications of both Societies numerous and valuable papers by him are to be found. He wrote chiefly on Coleoptera, but also occasionally on other orders of Insecta.

Henry Edwards will be much missed by entomologists both in Europe and America, as well as in Australia, where he was known and esteemed by a very wide circle of friends. An Englishman by birth, Mr. Edwards lived the later years of his life in America, where he was well known as an

actor and theatre proprietor, all his leisure time being devoted to the study of Entomology generally, but chiefly of North America, his collection in this branch of Entomology being one of the most important in that country. Mr. Edwards was a great traveller, and in his professional capacity visited the chief centres of population in Australia and New Zealand. He latterly resided in New York, where he died last year. He was a frequent contributor to several of the leading entomological journals of America, in which he described many species, chiefly Heterocera, belonging to the North American fauna and that of Mexico.

Robert Gillo, well known as a successful collector of Coleoptera in the West of England, and Dr. J. M. J. af Tengström, a distinguished Micro-Lepidopterist of Finland, have also passed away.

In conclusion, I beg leave to thank all the members of the Society who have so kindly supported me during the past year, and especially the Officers, from whom I have had every consideration.

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WEST, NEWMAN AND CO., PRINTERS, HATTON GARDEN, LONDON, E.C.

THE

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1891.

I. *Notes on the genitalia of a gynandromorphous* Eronia Hippia.

By GEORGE T. BAKER, F.L.S.

[Read October 1st, 1890.]

PLATE I.

SOME six months ago a gynandromorphous *Eronia Hippia* v. *Gæa* was exhibited at one of your meetings, the abdomen of which specimen (through the generosity of its owner, Mr. Griffiths) has since been sent to me for examination and dissection. I must admit that, though I undertook the work with much interest, it was not without a considerable amount of misgiving as to what the result might be, which result I now propose to lay before you.

The most important memoirs on the genitalia of Rhopalocera are those by Dr. F. B. White and the late Mr. Philip H. Gosse,* besides which we have also the

* Trans. Linn. Soc., vol. i., p. 357, and vol. ii., p. 265. Zoology. Second series.

investigations of Messrs. Scudder and Burgess;* all of these treat of the male organs only, whilst of the female organs practically nothing has been published, though they are certainly worthy of examination.

At the anal extremity of the insect under consideration there was a considerable protrusion of some membrane, either fatty or muscular, but evidently, from its nature and colour, not chitinous. If fatty, it would be soluble in ether; if muscle, liquor potassæ would dissolve it. I therefore first immersed it in the former, which did not produce the slightest effect; so from this I put the abdomen into a solution of potass, which caused the emitted portion to disappear rapidly; I therefore conclude that this membrane must have been muscular, and arising from the general malformation of the butterfly, as it exhibited no signs of pressure or rough usage. Having mounted it in the usual way (I did not dissect it, but prepared the whole abdomen with all the organs *in situ*, as far as possible), I will now describe the whole of the genitalia, comparing them with the same organs of ♂ and ♀ *Hippia* v. *Gæa*, and will adhere to the terms for the various parts as adopted by Dr. White and Mr. Gosse.

It may be advisable to mention that my drawings were all made with a camera, Nos. 1 and 2 being magnified about 15½ diameters, No. 3, 31 diameters, Nos. 1 A, 1 B, 1 D, and 4 about 47 diameters, and Nos. 1 C and 2 A about 23½ diameters.

Valves, fig. 1 *a*. The right valve is well-developed, though slightly abnormal; it is roughly triangular in shape, with the base hollowed internally, the upper (internal) extremity of which is produced into a narrow hooked finger curved slightly downwards, the lower extremity being rounded; the apex is likewise digitate, but turned upwards. Between the upper extremity of the base and the apex, about one-third of the distance from the former, is hinged a curious arm-like pendant, fitted with a sort of elbow attachment to a small excrescence on the margin, to which is fixed a hanging process (fig. 1 *b* 1 and 1 B), which is evidently one of the ♀ clasps (if I may so call them), the ♀ sex being provided with a pair of weak clasps. The left valve is entirely

* 'Proceedings' of the Boston (U.S.) Soc. of Nat. Hist., April, 1870.

abnormal. It is composed partly of the ♂ valve and partly, I think, of the ♀ clasp. It will be seen from the figure 1*a*1 that it is hollowed like a boat, open at one end, and terminating in a point at the other, whilst from about its centre rises a structure (fig. 1*b*), which is probably composed of the pendant, already mentioned, and the other ♀ clasp, both being much aborted. The two sides of the open end rise into two points, giving the organ a curious appearance.

The tegumen and uncus (which Mr. Gosse looked upon as separate organs, but which are not so in reality, the latter being the terminal joint of the former) are very abnormal.

The tegumen (fig. 1*d*), instead of being a regular hood-like structure most developed posteriorly, *i. e.*, towards the head of the insect, has only quite a slight hood-formation at its hinder and upper portion, but is developed more forwards, becoming a fairly broad lobe at its juncture with the uncus; furthermore, instead of working by a double arm, one on each side the abdomen, it has only a single armed attachment on the right side (fig. 1*d*1).

The uncus (fig. 1*c*) is simply a finger-like extremity of the tegumen, and is abnormally fixed into this organ, not jointed to it as usual.

We now come to an organ that has not been mentioned (so far as I can find) by any of my predecessors in these investigations, *viz.*, a sort of bag or little sack, which I will call the "saccus," from the Latin "saccus," a bag (figs. 1*e* and 2*e*). It is an organ confined to the male sex, wherein the working joints of both valves and tegumen have their seat. In the gynandromorphous specimen this is again abnormal, being simply a longish narrow tube affixed on to the posterior extremity of the valves, and into which the arm of the tegumen (fig. 1*d*1) is also fixed a little further along.

The penis (fig. 1*f*) is wonderfully developed, as it is in all the species of this genus that I have examined. In typical v. *Gæa* it is a good-sized tube of fairly uniform size, but in this specimen it is rather narrower for the first three-fifths, when it suddenly expands out into a large and broad termination, not unlike the butt-end of a rifle. There is also within this organ a sort of membranous short tubular sack. This member is also

figured at 1 c, magnified about 23½ diameters, so that its curious structure can thus be easily seen.

The ovarian sack is also present and well-developed, with nothing unusual about it.

At fig. 1 A the left abnormal ♀ clasp is shown magnified about 47 diameters (in fig. 1 it is numbered *b*); it is fixed on to the valve near the centre, and is somewhat globose in shape, being attached to the valve by a pyramidal neck, probably the other hanging pendant, already mentioned. Similarly magnified at fig. 1 B is the right equally curious ♀ clasp (in fig. 1 numbered *b* 1); it is shown affixed to the arm-like pendant, so that the structure of both the aborted clasp and the pendant is readily seen. The ♀ clasp appears to be sufficiently large to form almost the two ordinary clasps of this sex.

In my figure (No. 2) of the typical genitalia of ♂ "v. *Gæa*," I have only drawn the one valve for the sake of clearness, and the one arm of the tegumen and the intromittent organ are shown dotted for the same reason.

The valve (fig. 2 *a*) is similar to that already described, but the inner curved extremity is more curved downwards, and the apex is longer and not curved quite so sharply as in the gynandromorphous insect, and the upper margin is produced upwards at about two-thirds from its apex into a sort of knob, from which hangs the arm-like pendant (fig. 2 *b*), which is likewise similar to that just described, only instead of having an elbow-jointed attachment, it simply hangs from the margin of the clasp.

The tegumen (fig. 2 *d*) is a well-developed hood of a saddle-like shape, elongated posteriorly downwards, and developed considerably more behind than before.

Dr. White describes the tegumen as forming "a chitinous ring more or less round the ventral arc." This ring forms more correctly two arms (fig. 2 *d* 1), each fixed in the saccus, and being capable of motion fore and aft, and also, to a certain extent, of lateral movement.

The uncus (fig. 2 *c*) forms the extremity of the tegumen, and in v. *Gæa* is somewhat the shape of a chough's bill, but broader at the tip in proportion, the apex of which lies between the upper margins of the two valves. It is probably capable of independent motion in a vertical direction, but I think is most likely incapable of further movement apart from the tegumen, to which it is jointed.

The saccus (fig. 2 *e*), whereto the joints of both valves

and tegumen are affixed, is a well-developed bag, rounded at the bottom and open, as a bag, at the top.

The penis (fig. 2*f*) is rounded at its hinder extremity, of moderately uniform width, slightly expanding near its tip, where it is wrapped up into many small folds, and from this is, I suppose, capable of grea expansion at this end (see also fig. 2A).

The external genitalia of the ♀ *Gæa* are shown at fig. 3, and consist of a very simple pair of clasps, if I may so term them : they usually spring from the upper part of the abdomen, and incline downwards, and are mostly covered with a mass of fine bristles, each arising from a small warty protuberance.

It will be seen from these descriptions and figures that the gynandromorphous specimen is more of a ♂ than ♀ in its generic organs. The wings similarly coincide with the genitalia, the right wings having ♂ coloration, and the left ♀ ; whilst in like manner the right organs are more characteristic of the ♂ than those on the left side.

I will now draw attention to a very curious organ found occasionally in the ovarian sack of many lepidopterous genera (but more especially, I believe, in the *Pieridæ*), which is present both in the abnormal v. *Gæa*, and also in the normal female examined by me. These are figured at 1D and 4. The shapes vary much in different genera, but, so far as my experience goes, each genus follows one form in a more or less modified shape ; for instance, among the earlier *Pieridæ* the form is generally somewhat akin to fig. 4, *viz.*, the normal v. *Gæa*, which is doubly ovate, joined together by a narrow neck, and studded all over with formidable teeth. It is enclosed in a tight-fitting sack (not visible in my figure, as I only discovered it when closely examining the organ under a high power). From this form it becomes much modified as we approach the genus *Colias*, where its shape almost entirely loses the ovate appearance. It will be seen from fig. 1D that in the gynandromorphous specimen its form is simpler, being somewhat that of a thick short club, which is destitute of the close-fitting sack, but lies bare within the ovarian sack, this being quite distinct from the former one. The only work in which I can find any mention of this organ is in that most valuable one by Salvin and Godman.

Having no suggestions to make on its probable use, I ought perhaps to apologise for bringing it before your notice; my object, however, is simply to hear what other insect anatomists have to say on the matter, and thus elucidate a curious and interesting organ.

Explanation of Plate I.

Fig. 1.—All the genitalia, *in situ*, of the gynandromorphous v. *Gæa*. *a*, right valve; *a* 1, left valve; *b* and *b* 1, abnormal ♀ clasps; *c*, uncus; *d*, tegumen; *d* 1, arm of tegumen; *e*, saccus; *f*, intromittent organ.

1 A and 1 B.—♀ abnormal clasps, further magnified.

1 C.—Intromittent organ, further magnified.

1 D.—Curious organ found in ovarian sack.

Fig. 2.—Genitalia of *Eronia Hippia* v. *Gæa* (typical). *a*, valve; *b*, pendant; *c*, uncus; *d*, tegumen; *d* 1, arm of tegumen; *e*, saccus; *f*, intromittent organ.

2 A.—Intromittent organ, further magnified.

3.—♀ clasps of typical v. *Gæa*.

4.—Curious organ found in ovarian sack of typical v. *Gæa*.

II. *A Monograph of British* Braconidæ. Part IV.

By the Rev. Thomas A. Marshall, M.A., F.E.S.

[Read November 5th, 1890.]

PLATE II.

XXIII. OPIIDES.

Clypeus either fitting closely to the mandibles, or raised in front so as to leave a narrow transverse aperture. Occiput concave, not margined (except in *Ademon*). Maxillary palpi 6-, labial 3—4-jointed. Mesothoracic sutures more or less complete or effaced. Wings ample, longer than the abdomen; fore wings with 3 cubital areolets, the 2d oblong or trapeziform, usually much broader than high; stigma lanceolate, attenuated, seldom elliptic or ovate; radial areolet ample; recurrent nervure evected, seldom interstitial and very rarely subrejected; prædiscoidal areolet usually petiolated. Radius and cubitus of the hind wings faintly traced or obsolete; basal nervures and præbrachial transverse generally distinct: the hind wings occasionally exhibit a pobrachial transverse nervure, more or less rudimentary (*cf.* in the fig., see "Horismology of Wings," Tr. Ent. Soc. Lond., 1885, p. 3). Abdomen subsessile or subpetiolated, usually short, ovate, or globose, somewhat more elongate in the ♂; suturiform articulation obsolete (except in *Ademon* and *Gnamptodon*), the other sutures visible. Terebra generally concealed or very short; rarely half as long, or as long, as the abdomen.

Head as broad as the thorax or broader; antennæ slender, filiform, usually longer than the body; face almost always carinated down the middle; mandibles large, often emarginate at the base beneath; palpi short (except in *Hedylus*); vertex convex posteriorly, merging insensibly into the occiput; ocelli small, depressed; prothorax generally inconspicuous; mesothorax commonly without distinct sutures, but in other cases these are variously developed; often a rounded or oblong impression is seen just before the scutellum;* abdomen showing 7 segments above, of

* Not to be confounded with the transverse cancellated fovea at the base of the scutellum, which is common to most parasiti Hymenoptera.

which 2—3 are connate and much the longest; the 2d suture almost always invisible, except in *Gnamptodon;* 1st segment short, seldom more than ¼ of the length of the abdomen, somewhat dilated posteriorly, narrower than the following segments, and variously sculptured. Radial areolet cultrate, ending not far from the extremity of the fore wing; stigma from ovate or lanceolate, becoming more and more linear and elongate until it occupies ¾ of the metacarpus, as in the inferior *Alysiides;* 2d cubital areolet also elongate and attenuated in various degrees; usually the sides converge slightly towards the extremity of the wing, but sometimes they are almost parallel; 2d intercubital transverse nervure faintly traced or extinct; præ- and pobrachial areolets equal, or the latter somewhat the longer; cubitus more or less effaced after passing the transverse nervures. The legs offer no peculiarity.

The *Opiides* form a natural group of considerable extent, found in both hemispheres, more abundantly in the northern and central countries. They are well placed next to the *Alysiides*, from which some of them are not distinguishable at first sight; but the latter may always be known by their everted mandibles. Many Opiids also resemble the Bracons; but they have not the oral aperture peculiar to the *Cyclostomi;* they differ, moreover, in the habits of their larvæ, and in having for the most part a concealed terebra. They do not settle upon flowers, but frequent shady places, where they may be captured, though never abundantly, upon low plants in the neighbourhood of water. Their parasitism has seldom been observed, but Goureau reared several from dipterous larvæ belonging to the genera *Chilosia*, *Cordyla*, *Tephritis*, and *Phytomyza;* and, according to Ratzeburg, they also attack Lepidoptera: not Coleoptera, for *Opius rubriceps*, Ratz., parasite of *Scolytus*, is a *Cenocœlius*.

The genus *Opius* is of Wesmael's creation; he described 40 species, including Haliday's *Ademon*, which the latter writer, following Nees v. Esenbeck, considered as a section of *Rhogas;* but, from the absence of the oral aperture proper to a Cyclostome, it is better placed in its present position. The only other writer who has much elucidated the groups is Haliday, whose monograph extends to 49 British species; one of these constitutes his genus *Gnamptodon*, and, of the rest, 22 were unknown to Wesmael. Ten species were previously

known to Nees v. Esenbeck, and arranged by him in the genus *Bracon*, Sectio III. (Mon., i., pp. 52—60). Six of these have been recognised and extracted by Wesmael and Haliday. *Bracon singulator*, Nees, and *Opius singularis*, Wesm., are two different insects with names too much alike. Of the species mentioned or described by Ratzeburg, *Opius rubriceps* belongs to the genus *Cenocœlius;* and *O. ventricosus*, occurring only in the index, is a misprint for *Ophion*. In Förster's Synopsis (Verh. d. pr. Rheinl., 1862) no less than 25 genera are proposed for the *Opiides*. Eight of them are founded upon undescribed insects, and must be rejected as mere names. The remaining 17 have not been of so much use to me as I expected; they depend each upon some trifling character peculiar to one species, and I found it impossible to maintain them as genera. The following names have therefore been here reunited to the genus *Opius* or to *Biosteres: Chilotrichia*, *Rhabdospilus*, *Holconotus*, *Allotypus*, *Therobolus*, *Hypocynodus*, *Hypolabis*, *Biophthora*, *Desmiostoma*, *Nosopœa*, and *Utetes*. On the other hand, I have retained *Biosteres* and *Diachasma*, which represent the leading sections of Haliday and Wesmael; each contains a group of similar species, and so far fulfils one of the most essential functions of a genus. Of the seven genera here adopted, the four first consist, unfortunately, of a single species each; yet they seem too aberrant to be included under *Opius*.

Since the year 1836, when Haliday wrote in the 4th vol. of the 'Entomological Magazine,' no notice has been taken of the Opiids in this country, and hardly any mention of them occurs in continental publications; they remain up to the present time among the most neglected of all hymenopterous tribes. In this attempt to reintroduce them to notice I have been unable to obtain any assistance from others, and hence the amount of new matter to be brought forward is necessarily small. Haliday's paper on *Opius* does not profess to be complete; the reader is throughout referred to Wesmael for detailed descriptions; and this, together with extreme conciseness, makes his work laborious to consult. I have endeavoured to remedy this by presenting the whole subject at one view, explained and arranged in a uniform manner, and I have added a few figures of unpublished forms in illustration of each genus.

These insects cannot be identified successfully without some attention to the preparation of the specimens. The principal characters will always have to be taken from the upper side, and with this object in view the specimen must by no means be pinned, which renders the display of the wings and legs almost impossible, besides destroying the thorax,—but it must be neatly set out on a card. It is necessary also in every case to inspect the clypeus and the fovea or furrow of the pleuræ, situated immediately above the middle coxæ, and this becomes impossible when the insect is fastened down flat. It will not do to provide against one of these difficulties and neglect the other; both must be overcome, or the result will almost certainly be disappointment. The question then arises how two requirements, apparently inconsistent with each other, can be fulfilled with the least amount of trouble. One obvious mode of proceeding is that which I have adopted for about two years, *viz.*, never to set a freshly taken *Opius* without first inspecting, and writing down, the two characters taken from the clypeus and the pleuræ. By this method not a moment of time is wasted, future certainty is provided for, and the proper preservation of the specimen is insured. If this preliminary examination be neglected, it is still possible so to set a specimen that it may be removed from the card at pleasure, not without trouble, but with very trifling trouble. Dr. Capron has explained, in the 'Entomologist,' how this may be effected, and it is not necessary to repeat his remarks here. A dried *Opius*, perfectly well-set, may be fixed on its card with an almost invisibly small drop of gum under the thorax, or better still, under the abdomen, leaving the antennæ, wings, and legs quite free. A wet camel-hair pencil dissolves this gum in a moment, and the specimen may then be examined in any position, and afterwards returned to its card.

Table of Genera.

(2) 1. Occiput acutely margined; body scabrous, not shining; radial areolet incompletely closed .. .. i. Ademon.

(1) 2. Occput not margined; general surface of the body shining, with only a few portions rugose; radial areolet closed (except in *Diachasma caffer*).

(4)	3.	Second abdominal segment impressed with two curved, transverse, punctate lines	ii. Gnamptodon.
(3)	4.	Second abdominal segment with no impressed lines.	
(6)	5.	Second abscissa of the radius shorter than the 1st intercubital nervure	iii. Hedylus.
(5)	6.	Second abscissa of the radius equal to, or longer than, the 1st intercubital nervure.	
(10)	7.	Second abscissa of the radius longer than the 1st intercubital nervure.	
(9)	8.	Radius springing from the extreme base of the stigma	iv. Eurytenes.
(8)	9.	Radius springing from any other point of the stigma	v. Opius.
(7)	10.	Second abscissa of the radius equal to the 1st intercubital nervure.	
(12)	11.	Stigma of the usual form, short, ovate or subtriangular, never emitting the radius from a point before the middle (except *D. rugosa*)	vii. Diachasma.
(11)	12.	Stigma elongate, narrow, emitting the radius from the middle or from a point before it ..	vi. Biosteres.

i. Ademon, *Haliday.*

Hal., Ent. Mag., i., 266.

Clypeus reaching the mandibles, and closing the mouth; cheeks defined by a cariniform line; occiput acutely margined; maxillary palpi 6-, labial 4-jointed. Body subscabrous or coriaceous, not shining. Prothorax distinct, deeply and transversely striated. Mesothoracic sutures effaced; the middle lobe canaliculated, and margined on either side by a raised line, which is highest in front. Mesopleuræ with a rugose furrow. Metathorax short, truncate, coarsely and irregularly reticulated. Wings much longer than the body, narrow; stigma wedge-shaped, attenuated, emitting the radius beyond the middle; recurrent nervure interstitial; 2d abscissa of the radius as long as the 1st intercubital nervure; radius and cubitus effaced after passing the 2d cubital areolet; pobrachial areolet somewhat longer than the præbrachial; hind wings very narrow, their pobrachial areolet as long as $\frac{1}{3}$ of the præbrachial; no anal nervure. Legs elongate, slender; femora and apex of the tibiæ subincrassated; claws elongate. Abdomen sessile, depressed, scabrous, dull, with distinct sutures; the segments in the ♀ widening from the base to about the end of the 2d, which is as long as the 1st; 3d scarcely a quarter as long as the 2d; the rest very short, annuliform, tapering to the extremity. Terebra concealed. In the ♂ the sculpture is less rough, the

abdomen longer, more depressed, the posterior segments more broadly visible, and the claws shorter.

1. *Ademon decrescens*, Nees. (Pl. II., fig. 1, ♀).

Rogas decrescens, Nees, Mon., i., 220; *A. decrescens*, Hal., Ent. Mag., iv., 104; *Opius decrescens*, Wesm., Nouv. Mém. Ac. Brux., 1838, p. 148, ♂ ♀.

Resembles a small *Rhogas*. Variable; usually black; mandibles, palpi, and legs rufo-piceous. Antennæ shorter than the body, 21—27-jointed; basal joints of the flagellum elongate, the others rapidly decreasing in length to the apex; last joint not longer than the penultimate; 3d joint equal to the 4 apical joints taken together. Scutellum preceded by a cancellated fovea. Wings variable (see *infra*); radix and squamula rufous, with a dark spot. Abdomen ♀ oblong-ovate, subconvex; segments 1, 2 equal in length, widened behind, densely punctulate or scabrous; suturiform articulation curved, deeply impressed; 3d segment punctulate, with the hinder margin smooth, forming a transverse carina; apical segments also smooth, or only the base of the 4th punctulate; posterior margin of all the segments ciliated. ♂ ♀. Length, 1—1¾; wings, 2½—3½ lines.

Haliday arranges the principal varieties in two sections :—

I. Wings infumated; stigma and nervures fuscous; body black, abdomen sometimes piceous behind. ♂ ♀.

Var. 1. Legs blackish, trochanters pale brown or yellow, base of tibiæ and tarsi sometimes pale.

Var. 2. Coxæ, femora, and base of tibiæ dull rufous; or legs rufous, with the tibiæ and tips of the tarsi dark.

Var. 3. Sides of prothorax rufous; the rest as in Var. 1.

II. Wings yellowish, clouded with fuscous at the base and apex; stigma yellow; nervures becoming paler towards the extremity. Females only.

Var. 4. Black; prothorax rufous; posterior margin of segments 3—4, and following segments entirely, piceous. Legs blackish, with yellow trochanters; base of the tibiæ and almost the whole of the tarsi, ferruginous.

Var. 5. Black; thorax in front, and abdomen after the 3d segment, rufous. Femora blackish brown; tibiæ brown; coxæ and greater part of the tarsi ferruginous; apex of femora and base of

tibiæ yellow. Sometimes a rufous patch on the occiput, and another beneath the antennæ.

Var. 6. Rufous; vertex, metathorax, and 1st abdominal segment, black; antennæ black; legs fuscous; coxæ, apex of femora, base of tibiæ and of tarsi, flavo-testaceous; trochanters yellow. Sometimes the metathorax and 1st segment are infuscated only in the middle, or the abdomen and legs are more flavo-testaceous; the extreme base of the 4 posterior femora, with the apex of their tibiæ and tarsi, fuscous.

Rare and local in England; Walker's collection contained only a single specimen; taken by Haliday much more frequently in the Hebrides and in Ireland, where he found it almost gregarious on aquatic plants by the sides of rivers. I have seen no specimens except my own, which were taken formerly by sweeping *Nasturtium officinale* in a ditch near Aylestone, in Leicestershire; at that place the insects were not uncommon, but no varieties occurred among them. Nees v. Esenbeck found his specimen on water-cress near Sickershausen, and received others from Bohemia and Italy. He has described a second species as *Rogas mutuator*, distinguished chiefly by the smoothness of the 3d abdominal segment; of this I captured a specimen in Corsica.

ii. Gnamptodon, *Haliday.*

Gnamptodon, Hal., Ent. Mag., i., 265 (1833).
Diraphus, Wesm., Nouv. Mém. Ac. Brux., 1838, p. 89.

Head transverse; clypeus separated from the mandibles by a narrow space in the form of a crescent; labial palpi 3-jointed. Mesothoracic sutures deep, impunctate, effaced posteriorly. Mesopleuræ smooth, without a furrow. Stigma ovate, lanceolate, emitting the radius a little before the middle; radial areolet oblong, lanceolate, ending not far from the tip of the wing; 2d abscissa of the radius almost as short as the 1st, making the 2d cubital areolet very narrow, trapeziform, and smaller than the 1st, which receives the recurrent nervure near its apex; pobrachial areolet longer than the præbrachial; anal nervure not interstitial. Abdomen subsessile, ovate; 1st segment obconic, striolate, bicarinate; 2d impressed near the base with an arcuate, punctate, transverse line across the disk, and another near the apex; the concave side of both impressions is towards the thorax; 3d suture superficial like the 2d, not diarthrodial, a character peculiar to this genus. Terebra very short, subulate, deflexed.

Nees v. Esenbeck described the single species of this genus as a *Bracon*, and Wesmael founded for it a new genus *Diraphus*, which he included among the *Cyclostomi;* the oral aperture, however (if it can be so called), is very different from that of the Braconoid genera, being merely a transverse slit caused by the clypeus not touching the mandibles, a structure characteristic of many Opiids, in accordance with which Haliday referred his genus *Gnamptodon* to its present place.

1. *Gnamptodon pumilio*, Nees. (Pl. II., fig. 2, ♀).

Bracon pumilio, Nees, Mon., i., 90, ♂ ♀.
G. pumilio, Hal., Ent. Mag., iv., 220, ♂ ♀; fig. *d* (wing).
Diraphus pygmæus, Wesm., Nouv. Mém. Ac. Brux., 1838, p. 90, ♂; pl. fig. F (abdomen).

Black, shining; belly testaceous; oral parts, 4 or 5 basal joints of antennæ, and legs, yellow; claws fuscous. Head minutely punctulate; middle of the face smooth. Antennæ about as long as the body, filiform, 19—23-jointed. Wings hyaline, squamula and nervures yellow, the latter very pale, mostly subobsolete; stigma fusco-testaceous; podiscoidal areolet open at the extremity. ♂ ♀. Length, $\frac{3}{4}$—1; wings, $1\frac{3}{4}$—$2\frac{1}{3}$ lines.

Not common; taken by Nees in Franconia; by Haliday in the Hebrides and Ireland, on leaves of *Betula alba;* by Wesmael in Belgium; found sparingly in England; I have seen specimens in Fitch's and Bignell's collections, and possess one myself, from which the figure is taken. Ratzeburg (Ichn. d. Forst., iii., 176) notices a *Bracon* bred from *Stigmonota dorsana*, F., which he refers conjecturally to Wesmael's *Diraphus;* but this gives no certain information, for the terebra of this insect was half as long as the abdomen; Ratzeburg compares it to *Bracon titubans*, Wesm.; it was not, however, a genuine *Bracon*.

iii. Hedylus, n. g.

Statura gracilis, antennis pedibusque elongatis. Clypeus apice elevatus; genæ dilatæ; palpi maxillares longissimi, labiales 4-articuli. Mesothoracis sulculi distincti. Mesopleuræ sulco crenato. Stigma fere ovale, radium ultra medium emittens; areola cubitalis 2da parva, transversa, latere externo obsoleto, angulo

interno fortiter producto; radii abscissa 2da nervo 1mo intercubitali brevior, abscissa 1ma perpaulo longior; nervus recurrens interstitialis; areola podiscoidalis non perfecte occlusa; nervus cubitalis pone areolam cubitalem 2dam deletus. Alarum inferiorum areola pobrachialis præbrachiali plus quam dimidio brevior; nervus analis nullus. Abdomen subpetiolatum, sulcis transversis nullis; suturæ præter primam obsoletæ; segmentum 1um elongatum fere lineare. Femina latet.

Form slender, with elongate antennæ and legs. Clypeus raised at the apex; cheeks dilated; maxillary palpi very long, labial 4-jointed. Mesothoracic sutures distinct. Mesopleuræ with a crenate furrow. Stigma subovate, emitting the radius beyond the middle; 2d cubital areolet small, transverse, its outer side obsolete, its inner angle much produced; 2d abscissa of the radius shorter than the 1st intercubital nervure, and very little longer than the 1st abscissa; recurrent nervure interstitial; podiscoidal areolet incompletely closed; cubital nervure effaced after passing the 2d cubital areolet. Pobrachial areolet of the hind wings less than half as long as the præbrachial; anal nervure none. Abdomen subpetiolated, without transverse impressions; all the sutures after the 1st indistinct; 1st segment elongate, sublinear. Female not known.

The unique insect here indicated is a true Opiid from the structure of the mouth, though otherwise much like an *Alysia*. The mandibles fit closely at the points; the clypeus does not touch them in the middle, its lower edge being raised so as to leave a small opening. Head subcubic, buccate, widest behind, and broader than the thorax; occiput concave, not margined; face subcarinated; maxillary palpi remarkably long, reaching to the hind coxæ. Middle lobe of the mesothorax truncate anteriorly; mesothoracic sutures impunctate, almost effaced posteriorly; a punctiform fovea before the scutellum. Abdomen as long as the head and thorax, gradually widened to the truncated anus, and depressed, appearing biarticulate from the extreme tenuity of the sutures; 1st segment rimulose, the rest smooth and shining. The 2d cubital areolet is not longer than that of *Gnamptodon*, but shorter, transverse, less contracted at the tip, and much more acutely produced inwards; the prædiscoidal areolet is subsessile; the straight radius reaches the top of the wing. With this may perhaps be compared Förster's undescribed genus *Mesotages*, in Verh. pr. Rheinl., 1862, p. 258.

1. *Hedylus habilis*, n. sp. (Pl. II., fig. 3, ♂).

Niger, capite, antennarum basi, prothorace, mesothoracis lateribus, abdominisque medio superne, testaceis. Palpi fere albidi. Stemmaticum nigrum; vertex, occiput, piceo-rufa. Scutellum etiam piceum. Alæ hyalinæ, squamula, nervis, stigmate, pallide fuscescentibus. Pedes flavidi coxis pallidioribus.

Black; head, antennæ broadly at the base, prothorax, sides of the mesothorax partly, and abdomen indeterminately in the middle, testaceous. Palpi very pale, whitish. Stemmaticum black; vertex and occiput piceo-rufous. Scutellum piceous. Wings hyaline, squamula, nervures, and stigma pale, fuscescent. Legs yellowish, with paler coxæ. ♂. Length, $1\frac{1}{2}$; wings, $3\frac{2}{3}$ lines.

Antennæ slender, setaceous, twice the length of the body, 36-jointed, the 3d joint much longer than the 4th; joints 1—8 testaceous, the rest gradually darkened to the apex. Metathorax short, sloping gradually, irregularly reticulated, with a smooth shining space on either side of the base; the apical margin somewhat acutely raised. Wings much longer than the abdomen; fore wings ample, the nervures distinct, except the cubitus, the 2d intercubital, and the extremity of the anal, which are effaced. Hind wings narrow, ciliated with long pale hairs. First abdominal segment scarcely dilated behind, 3 times longer than its apical breadth, longitudinally convex with depressed lateral margins, rimulose, black, the extreme base testaceous; the rest of the abdomen smooth, shining, blackish, broadly and indeterminately testaceous on the disk.

The only specimen was discovered by Bignell in South Devon.

iv. Eurytenes, *Förster*.

Först., Verh. pr. Rheinl., 1862, p. 259.

Distinguished from *Opius* only by its peculiar wings. Face carinated; mouth closed. Mesopleuræ impressed with a crenate furrow. Mesothorax elevated, gibbous, subrugulose, without visible sutures. Metathorax very short, abruptly sloping, contracted behind. Fore wings ample, dilated and obtusely rounded at the extremity; stigma very long and narrow, incrassated towards the apex; radius springing from its *extreme base;* 1st abscissa making a very obtuse angle with the 2d, but not in a line with it (as represented by Wesmael); 3d abscissa straight, reaching the end of the wing, and enclosing a large cultriform radial areolet; 2d cubital areolet larger than the 1st, both trapezoidal; recurrent nervure

interstitial; cubital and anal nervures effaced towards their extremity. Hind wings shorter by a half, narrow, linear. Abdomen almost petiolated; 1st segment short, narrow, linear, rugulose, with distinct tubercles; the following segments form a smooth oval, as broad as the thorax. Terebra hardly exserted.

1. *Eurytenes abnormis*, Wesm. (Pl. II., fig. 4, wing).

Opius abnormis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 117, pl. ii., fig. 5 (wing); Hal., Ent. Mag., iv., 204, fig. *c* (wing, more correctly drawn); Ratz., Ichn. d. Forst., ii., 62, ♂ ♀.

Black; abdomen dull testaceous or piceous; darker at the apex in the ♂. Antennæ (broken in my specimen) filiform, longer than the body; 1st joint, tip of the 2d, and base of the 3d, testaceous. Mandibles, palpi, and margin of the clypeus, pale testaceous. Metathorax rugulose, except on each side of the base. Wings hyaline, squamula, stigma, and nervures brownish. Legs testaceous; tips of the hind femora, most part of their tibiæ, and their tarsi, infuscated. ♂ ♀. Length, 1—1¼; wings, 2⅓—3 lines.

A single pair were discovered by Wesmael near Brussels; a ♀ in North Ireland by Haliday; a ♂ at Windsor by Walker; and a ♀ of unknown origin is in my collection. Ratzeburg (*l. c.*) briefly mentions an *Opius paradoxus*, bred by Bouché from the maggot of *Pegomyia bicolor*, Wied., which had the wings of *Eurytenes*, except that the 2d and 3d cubital areolets were not separated. The 2d intercubital nervure is subobsolete in nearly all the Opiids, and I presume Ratzeburg's insect was the present species.

v. Opius, *Wesmael.*

Wesm., Nouv. Mém. Ac. Brux., 1835, p. 115; Hal., Ent. Mag., iv., 203.

Radial areolet closed; radius never springing from the base of the stigma; its 2d abscissa longer, often much longer, than the 1st intercubital nervure; stigma elongate, narrow. The other characters are those of the subfamily (see *ante*).

The preceding genera given in the table cannot be confounded with *Opius*; of the two remaining genera, *Diachasma* is at once recognised by the short oval stigma, and *Biosteres* by the 2d cubital areolet, which is not

horizontally elongate, the upper side being never longer than the inner side. *Diachasma* and *Biosteres* agree in the form of the 2d cubital areolet, but differ in the stigma, which in *Biosteres* is elongate, like that of *Opius*. No other structural differences of importance appear to exist, and perhaps the separation of *Diachasma* and *Biosteres* from *Opius* is a needless refinement.

Of the 40 species about to be described in this genus, *ochrogaster*, *ruficeps*, and *testaceus*, Wesm., were unknown to Haliday; *compar* and *zelotes* are new species. Not being possessed of all the species, I have been unable to complete several of the existing descriptions, in which important characters are sometimes omitted.

Table of Species.

(42)	1. Furrow of the mesopleuræ smooth, impunctate, or obsolete.	
(41)	2. Recurrent nervure evected; seldom interstitial or subinterstitial.	
(20)	3. Mesothorax without a punctiform impression before the scutellum.	
(17)	4. Clypeus not reaching the mandibles; mouth open.	
(6)	5. First abdominal segment smooth, without sculpture	1. *lugens*, Hal.
(5)	6. First abdominal segment more or less rimulose or rugulose.	
(8)	7. Antennæ 19-jointed	2. *pendulus*, Hal.
(7)	8. Antennæ with more than 19 joints.	
(12)	9. Antennæ 21—28-jointed.	
(11)	10. Antennæ 21—23-jointed, not longer than the body, even in the ♂; terebra ♀ equal to one-half or two-thirds of the abdomen; legs stout	3. *pygmæator*, Nees.
(10)	11. Antennæ 27—28-jointed, longer than the body, in the ♂; terebra ♀ hardly as long as the last segment of the abdomen; legs slender	4. *apiculator*, Nees.
(9)	12. Antennæ 31—34-jointed.	
(14)	13. Legs rufous	5. *clarus*, Hal.
(13)	14. Legs flavo-testaceous.	
(16)	15. Antennæ broadly testaceous at the base	6. *victus*, Hal.
(15)	16. Antennæ with only the scape pale ..	7. *spretus*, Hal.
(4)	17. Clypeus reaching the mandibles and closing the mouth.	
(19)	18. Upper side of the 2d cubital areolet distinctly longer than the inner side; antennæ 30-jointed	8. *tacitus*, Hal.

(18) 19. Upper side of the 2d cubital areolet hardly longer than the inner side; antennæ 26-jointed .. .. .. 9. ***exilis***, Hal.

(3) 20. Mesothorax with a punctiform impression just before the scutellum.

(24) 21. Clypeus reaching the mandibles and closing the mouth.

(23) 22. Apex of the abdomen black or piceous; antennæ 25—30-jointed .. .. 10. *pallidipes*, Wesm.

(22) 23. Apex of the abdomen rufous; antennæ 41—42-jointed .. .. .. 11. *amalis*, Wesm.

(21) 24. Clypeus not reaching the mandibles; mouth open.

(34) 25. Abdomen entirely black or dark piceous.

(27) 26. Second abscissa of the radius hardly longer than the 1st intercubital nervure; (antennæ 37-jointed) .. 12. *vindex*, Hal.

(26) 27. Second abscissa of the radius distinctly longer than the 1st intercubital nervure.

(29) 28. Second cubital areolet not narrowed outwards, the upper and lower sides being parallel .. .. .. 13. *celsus*, Hal.

(28) 29. Second cubital areolet narrowed outwards, the upper and lower sides not parallel.

(31) 30. Mesothoracic sutures complete, though shallow; legs of the ♀ very stout; antennæ ♀ 27-jointed .. .. 14. *crassipes*, Wesm.

(30) 31. Mesothoracic sutures effaced; legs of ordinary thickness in both sexes.

(33) 32. Recurrent nervure interstitial; antennæ 29—34-jointed .. .. 15. *scevus*, Hal.

(32) 33. Recurrent nervure evected; antennæ 20—24-jointed .. .. .. 16. *instabilis*, Wesm.

(25) 34. Abdomen entirely or in great part testaceous; the 1st segment black.

(36) 35. Radial areolet ending acutely on the fore border of the wing, much before the extremity .. .. .. 17. *ochrogaster*, Wesm.

(35) 36. Radial areolet cultriform, ending at or near the extremity of the wing.

(38) 37. Mesothoracic sutures faintly but completely traced; head of the ♀ red 18. *compar*, n. sp.

(37) 38. Mesothoracic sutures obsolete; head black in both sexes.

(40) 39. Abdomen (after the 1st segment) wholly testaceous in the ♀, black at the apex in the ♂; tips of hind tibiæ always fuscescent .. .. 19. *maculipes*, Wesm.

(39) 40. Abdomen (after the 1st segment) testaceous, with a fuscous band on each segment, in both sexes; hind tibiæ wholly testaceous .. .. .. 20. *cingulatus*, Wesm.

(2) 41. Recurrent nervure rejected .. .. 21. *irregularis*, Wesm.

(1) 42. Furrow of the mesopleuræ crenate or rugose.

(72) 43. Recurrent nervure evected.

(47) 44. Clypeus reaching the mandibles; mouth closed.

(46) 45. Abdomen (after the 1st segment) rufo-testaceous; metathorax rugulose; length 1¼ l. .. .. 22. *leptostigmus*, Wesm.

(45) 46. Abdomen entirely black or piceous; metathorax smooth; length ¾ l. .. 23. *parvulus*, Wesm.

(44) 47. Clypeus not reaching the mandibles; mouth open.

(49) 48. Mesothoracic sutures effaced .. 24. *docilis*, Hal.

(48) 49. Mesothoracic sutures inchoate or complete.

(61) 50. Mesothoracic sutures inchoate, effaced posteriorly.

(60) 51. Abdomen wholly black or piceous, except sometimes the base of the 2d segment, which is more or less rufo-testaceous.

(53) 52. Radial areolet ending acutely on the fore border of the wing, much before the extremity .. .. .. 25. *nitidulator*, Nees.

(52) 53. Radial areolet cultriform, ending at or near the extremity of the wing.

(55) 54. Antennæ ♂ only 21-jointed; legs dark coloured .. .. .. 26. *æthiops*, Hal.

(54) 55. Antennæ with more than 21 joints; legs rufo- or flavo-testaceous.

(57) 56. Legs rufo-testaceous .. .. .. 27. *pactus*, Hal.

(56) 57. Legs flavo-testaceous.

(59) 58. Length 1 line; (antennæ ♀ 27-jointed) 28. *æmulus*, Hal.

(58) 59. Length 1½ line; (antennæ ♂ 37—38-jointed) .. .. 29. *zelotes*, n. sp.

(51) 60. Abdomen (after the 1st segment) testaceous, the hind borders of the segments fuscescent .. .. 30. *polyzonius*, Wesm.

(50) 61. Mesothoracic sutures complete.

(63) 62. Head rufous .. .. 31. *ruficeps*, Wesm.

(62) 63. Head black.

(65) 64. Scutellum rugulose .. .. .. 32. *bajulus*, Hal.

(64) 65. Scutellum smooth.

(67) 66. Humeral angles of the mesothorax truncated .. .. 33. *truncatus*, Wesm.

(66) 67. Humeral angles of the mesothorax rounded as usual.

(69) 68. Face and mesothorax scabrous, dull .. 34. *rudis*, Wesm.
(68) 69. Face and mesothorax smooth, more or less shining.
(71) 70. Second abdominal segment scabrous, dull .. .. 35. *cæsus*, Hal.
(70) 71. Second abdominal segment smooth, shining .. .. 36. *reconditor*, Wesm.
(43) 72. Recurrent nervure rejected; rarely interstitial.
(74) 73. Face and thorax rugulose .. .. 37. *cælatus*, Hal.
(73) 74. Face and thorax smooth.
(76) 75. Head, thorax, and abdomen testaceous; terebra as long as the abdomen .. 38. *testaceus*, Wesm.
(75) 76. Head, thorax, and abdomen black, sometimes with a few rufous marks; terebra subexserted.
(78) 77. Orbits black; antennæ 36—42-jointed; 1st abdominal segment short, broad; 2d without a transverse channel .. 39. *rufipes*, Wesm.
(77) 78. Orbits rufous; antennæ 21—31-jointed; 1st abdominal segment long, narrow; 2d impressed with a faint transverse channel .. .. .. 40. *comatus*, Wesm.

1. *Opius lugens*, Hal.

Opius lugens, Hal., Ent. Mag., iv., 206, ♀.

Black, very shining. Clypeus not touching the mandibles. Antennæ as long as the body, 21—23-jointed. Palpi fusco-testaceous. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax quite smooth. Wings hyaline, stigma and nervures fuscous; radial areolet ending before the extremity of the wing; recurrent nervure evected; hind wings with a vestige of the pobrachial transverse nervure. Legs fusco-testaceous; coxæ black; base of fore femora, 4 posterior femora almost entirely, hind tibiæ, and tips of all the tarsi, fuscous. Abdomen suborbicular; 1st segment slender, narrowly obconic, entirely smooth. Male unknown. Length, ¾ line.

According to Haliday, distinguished from *apiculator* (sp. 4) by the somewhat broader stigma and shorter 2d cubital areolet, attenuated towards the apex. Unknown to me, but indicated as occurring rarely in England, Ireland, and the Hebrides.

2. *Opius pendulus*, Hal.

O. pendulus, Hal., Ent. Mag., iv., 205, ♂ ♀.

Black; clypeus brown, not touching the mandibles; palpi very long, testaceous, fuscous at the base. Mandibles testaceous, dilated and emarginate at the base beneath. Antennæ shorter than the body, 19-jointed. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax shining, almost smooth. Wings hyaline, squamula piceous, stigma and nervures fuscous; recurrent nervure evected; 1st abscissa of the radius longer than in *pygmæator* (sp. 3), not punctiform; radial areolet smaller; 2d cubital areolet longer; hind wings broader. Legs fusco-testaceous, with black coxæ; base of tibiæ, and a lateral streak on the femora, paler; tarsi fuscous. First abdominal segment rimulose, somewhat shining. Terebra as long as one-fourth of the abdomen. Length, 1 line.

Unknown to me. Found by Haliday very rarely in North Ireland; Walker took both sexes in the London district.

3. *Opius pygmæator*, Nees.

Bracon pygmæator, Nees, Mon., i., 52; *O. pygmæator*, Hal., Ent. Mag., iv., 205, ♂ ♀.

O. funebris, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 124, ♂ ♀.

Black, shining. Face faintly carinated; clypeus not quite touching the mandibles, separated from the face by a semicircular line ending on either side in a punctiform impression, black with the apex pale, seldom entirely black; mandibles testaceous, broadly dilated and almost always sinuated at the base; palpi blackish. Antennæ black, as long as the body, filiform, 21—23-jointed. Thorax smooth and shining; sutures of the mesothorax effaced. No punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Wings dull hyaline; nervures brownish; stigma testaceous, elongate, narrow, attenuated at both ends, emitting the radius at one-fourth of its length from the base; 1st abscissa punctiform; 2d not quite twice as long as the 1st intercubital nervure, which is twice as long as the 2d intercubital nervure; this last is colourless and subobsolete; radial areolet almost reaching the tip of the wing; recurrent nervure evected. Legs stouter than in *apiculator* (sp. 4), pale piceous, coxæ black, 1st joint of the trochanters obscure; femora dusky on

their upper edge, the 4 posterior often almost entirely dark; tibiæ more or less dusky towards the apex; tarsi dark, with the ends of the articulations paler. Abdomen ♀ depressed, ovate; of the ♂, narrower; 1st segment obconic, with a basal fovea, the lateral edges of which are cariniform; generally somewhat rugulose in the middle and posteriorly. Terebra as long as ½ or ⅔ of the abdomen. ♂ ♀. Length, 1; wings, 2 lines.

Common. Wesmael described *O. funebris* from 14 females and 3 males taken near Brussels. He expresses a doubt whether it is the *pygmæator* of Nees, but the reasons for this uncertainty are very trivial, and Haliday has not hesitated to unite the two. Another difficulty seems to be the colour of the stigma, described as dark (*noirâtre*) by Wesmael, while, according to Nees, and in all the English specimens, it is very pale fuscous, or testaceous. The ♀ is remarkable in this genus for the length of the terebra; the ♂ can only be distinguished from that of *apiculator* by its stouter legs and shorter antennæ.

4. *Opius apiculator*, Nees.

Bracon apiculator, Nees, Mon., i., 56; *O. apiculator*, Hal., Ent. Mag., iv., 206, ♂ ♀.

Black; mouth and palpi testaceous. Clypeus not touching the mandibles. Antennæ slender, filiform, as long as the body in the ♀, longer in the ♂, 27—28-jointed, black, the 3 first joints often more or less rufous. Mesothoracic sutures obsolete. No punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax almost smooth. Wings ample, much longer than the body, hyaline; nervures fuscous; stigma narrow, elongate, piceo-testaceous, emitting the radius at about ¼ of its length; 1st abscissa short but distinct; 2d one-half longer than the 1st intercubital nervure; 3d somewhat curved, reaching the margin of the wing very near its extremity; recurrent nervure evected. Legs rufo-testaceous; base of hind coxæ and apex of their tibiæ fuscescent. Abdomen ovate; 1st segment rimulose, black, somewhat piceous at the sides; 2d with two oblique impressions indicating the gastrocœli. Terebra hardly as long as the last segment. ♂ ♀. Length, ¾; wings, 2 lines.

Var. 1. Base of the 2d abdominal segment pale.

Var. 2. Hind coxæ and femora fuscous above.

Var. 3. Scape of antennæ, and legs entirely, testaceous. Haliday.

Generally distributed, and common in woods, both in England and Ireland. *O. levis* and *exiguus*, Wesm., were supposed by Haliday to be identical with this species; they have, however, the 1st abdominal segment smooth, not rimulose, and in that respect resemble rather *O. lugens*, Hal. (sp. 1). I am not able, from the want of specimens, to clear up the doubts attending these little-known insects. *O. apiculator*, Nees, differs from *lugens*, Hal., in having the 1st segment finely rimulose, though still rather shining.

5. *Opius clarus*, Hal.

O. clarus, Hal., Ent. Mag., iv., 206, ♀.

Black; base of 2d abdominal segment rufous. Clypeus and mandibles rufous, the latter emarginate beneath at the base, and not touching the clypeus. Antennæ 34-jointed, longer than the body; scape rufous. Mesothoracic sutures obsolete. No punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax smooth in the middle, rugulose on the sides. Furrow of the mesopleuræ impunctate. Wings hyaline; squamula rufous; nervures fuscous; stigma paler fuscous, narrow, linear, lanceolate, emitting the radius before ½ of its length; radial areolet nearly reaching the extremity of the wing; 2d cubital areolet very little narrowed outwards; recurrent nervure evected. Hind wings with a vestige of the pobrachial transverse nervure. Legs rufous; fore coxæ testaceous. First abdominal segment oblong, rugulose; 2d segment rufous, determinately black at the apex; the following segments black. Terebra subexserted. Male unknown. Length, 1 line.

I have not met with any *Opius* which can be referred with certainty to this species, which is not sufficiently distinguished from *spretus* (sp. 7); in fact, no distinctive character is pointed out except the uncertain difference between rufous and flavo-testaceous. The locality also is omitted.

6. *Opius victus*, Hal.

O. victus, Hal., Ent. Mag., iv., 207, ♀.

Black; mandibles and clypeus testaceous; clypeus not reaching the mandibles; palpi elongate, very pale; face obsoletely carinated. Antennæ one-half longer than the body, 31—34-jointed, fuscous, broadly testaceous at the base. No punctiform impression before

the scutellum. Mesopleuræ with an impunctate furrow. Metathorax punctate-rugulose, somewhat shining. Wings elongate, hyaline; squamula testaceous; nervures and stigma fuscous, the latter very narrow, linear, emitting the radius near its base; radial areolet reaching the extremity of the wing; 2d cubital areolet elongate, not at all attenuated outwards, equal in length to the 3d; recurrent nervure evected; podiscoidal areolet closed. Pobrachial transverse nervure of the hind wings inchoate. Legs flavo-testaceous; hind tibiæ fuscous at the apex, their tarsi fuscous, the articulations annulated with paler colour. First abdominal segment punctate-rugulose, black, somewhat shining, sublinear; 2d fusco-testaceous, with a fovea on each side at the base. Terebra exserted, very short. Male unknown. Length, ¾—1 line.

This species is compared to *analis*, Wesm. (sp. 11), but differs in having no punctiform impression before the scutellum, the clypeus does not reach the mandibles, the radius originates nearer to the base of the stigma, the 1st abscissa is shorter, and the 2d cubital areolet much longer. Unknown to me; taken by Haliday very rarely, in autumn, on the banks of the Shannon.

7. *Opius spretus*, Hal.

O. spretus, Hal., Ent. Mag., iv., 207, ♂ ♀.

Black; base of the 2d abdominal segment testaceous. Form, sculpture, and neuration of wings the same as in *O. clarus* (sp. 5), only the colours somewhat different. Clypeus and mandibles testaceous; clypeus not reaching the mandibles; palpi more yellowish. Antennæ 31—34-jointed, the scape testaceous. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Furrow of the mesopleuræ impunctate. Legs flavo-testaceous; apex of hind tibiæ obscure, as well as their tarsi. Second abdominal segment dull testaceous at the base, with an obsolete fovea on each side; fuscous at the apex; belly pale. Terebra subexserted. ♂ ♀. Length, 1 line.

Taken by Haliday in North Ireland at the beginning of October, also on the banks of the Shannon; Walker found the ♂ in England. The only difference between this and *O. clarus* (sp. 5) seems to consist in the colour of the legs, palpi, &c., which in the former species are flavo-testaceous, and in the latter rufous. I have two females taken respectively at Nunton, Wilts, and Bishop's Teignton, Devon, the legs of which are more yellow than

red, and hence I am inclined to refer them to the present species, rather than to *O. clarus*.

3. *Opius tacitus*, Hal.

O. tacitus, Hal., Ent. Mag., iv., 207, ♂.

Black; base of the 2d abdominal segment rufous. Face subcarinated; clypeus reaching the mandibles; both testaceous. Antennæ about one-half longer than the body, 30-jointed, broadly rufo-testaceous towards the base. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Furrow of the mesopleuræ impunctate. Metathorax rugulose. Wings hyaline; squamula testaceous; nervures fuscous; stigma fusco-testaceous, linear-lanceolate; 2d cubital areolet attenuated outwards; recurrent nervure evected. Pobrachial transverse nervure of the hind wings inchoate. Legs testaceous. First abdominal segment rugulose. Length, 1 line.

? Var. 1, ♀. Smaller; base of antennæ fuscous, only the scape testaceous. Stigma narrower. Legs very pale testaceous. Second abdominal segment fuscous; terebra briefly exserted. Length, ¾ line.

Originally mixed up by Haliday with *victus* or *spretus* (spp. 6, 7); from the latter it differs in having the joints of the antennæ longer, and the 2d cubital areolet shorter. Compare *Bracon circulator* and *orbiculator*, Nees, Mon., i., 54, 55, the descriptions of which apply equally to several species of *Opius*. I have not seen *O tacitus*, which, according to Haliday, is very rare in North Ireland; a single specimen was taken by Walker in the London district.

9. *Opius exilis*, Hal.

O. exilis, Hal., Ent. Mag., iv., 208, ♀.

Similar to *O. tacitus* (sp. 8) and *O. parvulus* (sp. 23). Black; 2d abdominal segment rufo-piceous. Mouth testaceous; clypeus reaching the mandibles. Antennæ hardly longer than the body, 26-jointed; scape testaceous. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax shining only in the middle of the base. Second cubital areolet short, attenuated outwards, its upper side scarcely longer than the inner; recurrent nervure evected. Legs testaceous, base of hind coxæ, and apex of all the tarsi, fuscous. Male unknown. Length, ¾ line.

Haliday says no more of this species, which, like several others, can hardly be recognised by the description. It differs from the preceding in having fewer joints in the antennæ, and from *O. parvulus* by the impunctate furrow of the mesopleuræ.

10. *Opius pallidipes*, Wesm.

O. pallidipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 118, ♂ ♀; pl. ii., fig. 6 (wing); Hal., Ent. Mag., iv., 208; Ratz., Ichn. d. Forst., ii., 62, pl. ii., fig. 31 (wing).

Black; mouth testaceous; 2d or 3d abdominal segment sometimes rufo-piceous. Face with a distinct shining carina, which reaches the base of the antennæ. Clypeus straight on its lower edge, touching the mandibles, black with the extremity testaceous; seldom wholly pale. Mandibles testaceous, much dilated at the base, which is often emarginate beneath. Palpi testaceous. Antennæ longer than the body, 25—30-jointed; 1st joint and extremity of the 2d testaceous, the 1st sometimes black beneath; joints 2—4 sometimes rufescent beneath, or the under side of all the joints paler than the upper. Mesothorax smooth and shining, its sutures effaced. A punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax finely rugulose, especially towards the extremity. Wings hyaline; radial areolet almost reaching the extremity; stigma very narrow, elongate, dull testaceous; recurrent nervure evected. Legs testaceous. Abdomen of the ♀ short and broad, more elongate in the ♂; 1st segment short, narrow, its posterior half usually rugulose. Terebra hardly as long as the last segment. Length, ¾—1 line.

Var. 1. Second abdominal segment partly or wholly dull testaceous. Wesmael compares this var. to *Bracon orbiculator*, Nees, which differs only in having the terebra as long as the two last abdominal segments. Ratzeburg's specimen (*l. c.*) belonged to this var.

Var. 2. Third abdominal segment rufo-piceous.

This species, which I have not met with, forms the genus *Hypolabis*, Förster. Wesmael's description was made from 15 females and 5 males, taken near Brussels from May to September; Walker captured a ♂ in the London district, having the base of the antennæ broadly rufescent. Goureau (Bull. de la Soc. des Sciences hist. et nat. de l'Yonne, 1863, p. 66 of the separate impression)

refers to *O. pallidipes*, Wesm., a parasite which he reared from *Tephritis onopordinis*, Fall.; but the description of the parasite is not technical enough to lead to its verification. The nervures and stigma are described as blackish, and the recurrent nervure as interstitial,—characters not applicable to the present species. We are informed by Ratzeburg (*l. c.*) that Bouché bred *O. pallidipes* from *Tortrix rosana*, L.; while, according to Boie, it was also bred by Bouché from a dipteron named by the latter *Anthomyia rumicis*, perhaps a *Pegomyia*, but which can hardly now be identified.

11. *Opius analis*, Wesm.

O. analis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 130; Hal., Ent. Mag., iv., 208, ♀.

Black; apex of the abdomen rufous. Face carinated; clypeus testaceous at the extremity, touching the mandibles, which are also testaceous; palpi very pale. Antennæ about twice as long as the body, 41—42-jointed; scape testaceous. Mesothorax smooth and shining, its sutures effaced. Mesopleuræ with an impunctate furrow. A punctiform impression before the scutellum. Metathorax finely rugulose. Wings ample, much longer than the body, faintly infumated; nervures fuscous, more or less pale; stigma fusco-testaceous, elongate, lanceolate, emitting the radius at ⅓ of its length; 1st abscissa as long as the width of the stigma; 2d not much longer than the 1st intercubital nervure; 3d curved; 2d intercubital nervure more or less obsolete, as also are the cubital and anal nervures towards their extremities; recurrent nervure evected; podiscoidal areolet completely closed. Legs elongate, slender, testaceous; tips of hind tibiæ, together with the hind tarsi, fuscescent. Abdomen elongate-ovate, apiculated posteriorly; 1st segment longitudinally rugulose, black; the second and following somewhat piceous, usually passing into rufous towards the anus. Terebra subexserted. Male unknown. Length, 1¼; wings, 3⅓ line.

Originally described by Wesmael from a ♀ with broken antennæ; Haliday possessed only two specimens from North Ireland and England. I have taken 5 in Essex, Monmouthshire, and Cornwall. The species is more easily identified than most of the preceding: it is strange that Wesmael should compare it with his *O. maculipes* and *ochrogaster* (spp. 19, 17), both of which are obviously different in structure, colour, and size.

12. *Opius vindex*, Hal.

O. vindex, Hal., Ent. Mag., iv., 210, ♂.

Black; mouth testaceous; mandibles emarginate at the base beneath; clypeus not touching the mandibles. Antennæ 37-jointed, one-half longer than the body; scape testaceous. Mesothorax (pierced with a pin, so that the place of the species cannot be determined). Mesopleuræ with an impunctate furrow. Metathorax rugulose, smooth in the middle. Second cubital areolet very short, *i. e.*, 2d abscissa of the radius hardly longer than the 1st intercubital nervure; recurrent nervure evected. Legs testaceous. Female unknown. Length, 1½ line.

Taken once by Haliday in North Ireland. Resembles the ♂ of *O. sævus* (sp. 15), but appears to be distinct. It is not likely to be recognised from the above short description.

13. *Opius celsus*, Hal.

O. celsus, Hal., Ent. Mag., iv., 209, ♂.

Black; antennæ much longer than the body, 33—36-jointed; joints 1—2 rufo-piceous; base of 3d joint testaceous. Clypeus touching the mandibles. Mesothoracic sutures effaced. A punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax rugulose. Wings ample, much longer than the body, greyish subhyaline; squamula testaceous; nervures and stigma fuscous; the latter emitting the radius before ⅓ of its length; recurrent nervure evected; radius slightly curved; 2d cubital areolet not attenuated outwards; 1st abscissa very oblique, about twice as long as broad; podiscoidal areolet open at the extremity; neuration of the hind wings distinct. Legs flavo-testaceous; tips of the tarsi infuscated; sometimes a fuscous spot at the base of the hind coxæ. Abdomen thinly beset with long pale hairs; oval in the ♂, circular in the ♀; 1st segment finely rugulose. Terebra subexserted. ♂ ♀. Length, 1—1¼; wings, 2¾—3¼ lines.

The ♂ much resembles that of *O. sævus* (sp. 15), except that the upper and lower sides of the 2d cubital areolet are nearly parallel. In the ♂ of *O. cingulatus*, Wesm. (sp. 20), the radial areolet and stigma are broader, and the sculpture of the metathorax and 1st abdominal segment coarser. Haliday omits the locality of this species, but I captured several in a wood near Nunton, Wilts, including the ♀, which does not differ materially from the other sex.

14. *Opius crassipes*, Wesm.

O. crassipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 127 ; Hal., Ent. Mag., iv., 209, ♀ .

Black ; mandibles testaceous in the middle, emarginate beneath at the base ; palpi blackish. Face distinctly carinated ; clypeus not reaching the mandibles, rounded at the extremity. Antennæ entirely black, 27-jointed, as long as the body. Mesothoracic sutures complete, shallow, ending in a punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax finely rugulose. Wings ample, much longer than the body, hyaline, stigma and nervures pale fuscous ; stigma elliptic, shorter and thicker than in *instabilis*, *pygmæator*, and *apiculator* (spp. 16, 3, 4), emitting the radius just before the middle ; radial areolet ending at some distance from the extremity of the wing ; radius slightly curved ; recurrent nervure conspicuously evected ; 1st abscissa of the radius very short, nearly as broad as long. Legs unusually stout, testaceous ; coxæ, 1st joint of trochanters, base of femora, as well as their upper and sometimes their lower edges, blackish ; tarsi and tips of hind tibiæ fuscescent. Abdomen short, convex ; 1st segment finely rugulose. Terebra as long as $\frac{1}{4}$ of the abdomen. Male unknown. Length, 1 ; wings, $2\frac{3}{4}$ lines.

Taken by Wesmael once only near Brussels : that author adds that he possessed a ♂ corresponding in all respects, except that the legs were more slender, whence he was led to doubt whether it belonged to the species ; analogy, however, tends to show that the slenderness of the legs is likely to be merely a sexual distinction. Haliday found two females in North Ireland, and I have four, captured at Niton, in the I. of Wight, and in the London district. This species constitutes Förster's genus *Hypocynodus*.

15. *Opius sævus*, Hal.

O. sævus, Hal., Ent. Mag., iv., 209, ♂ ♀ .

Black ; clypeus and mandibles testaceous, the former not touching the latter. Mandibles not emarginate at the base. Antennæ longer than the body, black with the scape testaceous, 29-jointed in the ♀ , 33—34-jointed in the ♂ . Mesopleuræ with an impunctate furrow. A punctiform impression before the scutellum. Metathorax rugulose. Wings hyaline ; squamula testaceous ; stigma and nervures fuscous ; stigma much attenuated, linear-lanceolate, emitting the radius before $\frac{1}{3}$ of its length ; radial areolet

reaching the extremity of the wing; 2d cubital areolet moderately long, scarcely attenuated outwards; recurrent nervure subinterstitial. Pobrachial transverse nervure of the hind wings distinct. Legs testaceous. First abdominal segment stout, rugulose, with two basal carinæ. Terebra not exserted. This species is larger than *instabilis* (sp. 16), with longer antennæ, much more ample wings, a longer radial areolet, and the recurrent nervure differently inserted. Length, $1\frac{1}{3}$; wings, $3\frac{1}{2}$ lines.

Both sexes taken by Haliday in the Hebrides in August; a ♀ in Devonshire by Walker.

16. *Opius instabilis*, Wesm.

O. instabilis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 126; Hal., Ent. Mag., iv., 209, ♂ ♀.

♀. Black, abdomen more or less piceous, the 2d segment sometimes paler above. Face faintly carinated; clypeus and mandibles testaceous; clypeus raised, not closing the mouth; mandibles much dilated at the base; palpi testaceous. Antennæ as long as the body, 20-jointed (in the ♀ specimens), submoniliform towards the apex. Mesothoracic sutures indicated in front by two small humeral foveæ. A punctiform impression before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax smooth, shining. Wings hyaline, somewhat whitish; nervures and stigma fusco-testaceous; stigma about six times as long as its greatest width, emitting the radius at $\frac{1}{4}$ of its length; 1st abscissa as long as half the thickness of the stigma; 2d abscissa almost twice as long as the 1st intercubital nervure; 3d abscissa straight, ending at some distance from the extremity of the wing; recurrent nervure conspicuously evected, so that the 2d cubital areolet becomes pentagonal. Legs testaceous; hind coxæ blackish, with the inner side testaceous; middle of hind femora, tips of their tibiæ, and their tarsi, fuscescent. Abdomen depressed; 1st segment slightly rugulose. Terebra somewhat longer than a quarter of the abdomen. ♂. Antennæ 22—24-jointed, joints 1—3 testaceous beneath, 3d joint and base of 2d testaceous above. Lower part of face, and cheeks, testaceous. Legs testaceous; hind coxæ sometimes obscure at the apex. Length, 1; wings, $2\frac{1}{4}$ lines.

? Var. 1. Antennæ entirely black, 25-jointed ♀, 27-jointed ♂. Clypeus black at the base; lower portion of the cheeks testaceous, more or less obscure. Four posterior coxæ blackish above. Wesmael.

Both sexes may be distinguished from the similar

pygmæator (sp. 3) by the punctiform impression before the scutellum, and by the insertion of the recurrent nervure. Taken by Haliday sparingly in North Ireland, and by Capron at Shiere, near Guildford; to the latter I am indebted for two ♀ specimens. Wesmael possessed 5 Belgian examples, 2 belonging to the variety.

17. *Opius ochrogaster*, Wesm.

O. ochrogaster, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 129, ♀, pl. ii., fig. 8 (wing).

Black; abdomen, after the 1st segment, testaceous. Face distinctly carinated; clypeus testaceous, reaching the mandibles and closing the mouth; mandibles and palpi testaceous. Antennæ longer than the body, 26—28-jointed, dull testaceous, fuscescent towards the apex. Mesothoracic sutures faintly indicated in front. A punctiform impression before the scutellum. Mesopleuræ with no visible furrow. Metathorax granulated, dull. Wings hyaline, stigma and nervures dull testaceous; stigma forming a shorter and broader oval than in *O. cingulatus* and *maculipes* (spp. 20, 19), and emitting the radius from a point nearer the middle; but the chief distinction lies in the direction of the radius—this makes a blunt angle at the 2d intercubital nervure, hardly greater than a right angle, and proceeds thence to the margin far from the extremity, and rather on the upper side of the wing; 2d cubital areolet short, attenuated outwards; podiscoidal areolet open at the extremity; recurrent nervure evected. Legs testaceous. First abdominal segment black, longitudinally rugulose; the following segments in the ♀ testaceous, in the ♂ the 3d and following segments are broadly fuscescent on the hind margin. Terebra subexserted. Length, 1—1¼; wings, 3—3½ lines.

I have met with both sexes of this species at Milford Haven and in Leicestershire; it was not known to Haliday, and Wesmael described it from a single Belgian specimen. It is easily mistaken for *maculipes* or *cingulatus*, but can be distingulshed by the wings; compare *O. nitidulator* (sp. 25), in which the radius takes the same direction.

18. *Opius compar*, n. sp.

Testaceus, mesothorace, metathorace, et abdominis segmento 1mo nigris. Caput crassiusculum, facie non carinata. Clypeus valde transversus, antice rectus, mandibulas apice nigras modo non

attingens. Palpi pallidi. Antennæ feminæ corpore longiores, 26-articulatæ, articulo 7mo et sequentibus fuscis, 3tio quam 4tus paulo longiore. Mesopleuræ sulco lato, impunctato. Mesothoracis sulculi tenuissimi at completi, foveolam versus punctiformem præ scutello conniventes. Thorax undique niger; metathorax rufo-piceo tinctus, nonnihil rugulosus, basin versus læviusculus. Alæ hyalinæ; areola radialis ad apicem usque producta; stigma una cum nervis, sordide testaceum, elongatum, radium ante trientem longitudinis suæ emittens; areola cubitalis 2da elongata, extus angustata; areola podiscoidalis subaperta; nervus recurrens longius evectus. Pedes testacei, pallidi, unguiculis fuscis. Abdomen ovale, convexum, testaceum, apicem versus gradatim obscurius, apice ipso fere nigro; segmentum 1um breve, nigrum, basi ipsa testacea, rugulosum, ubique æquilatum, tuberculis paulo pone medium prominentibus; cætera lævia, nitida. Terebra segmentis duobus ultimis longitudine æqualis. Mas incognitus.

Testaceous, meso- and metathorax, together with the 1st abdominal segment, black. Head large; face not carinated. Clypeus very transverse, straight on its lower edge, not quite reaching the mandibles, which are black at the points. Palpi pale. Antennæ ♀ longer than the body, 26-jointed, the 7th and following joints fuscous; 3d joint somewhat longer than the 4th. Prothorax testaceous. Mesopleuræ with a broad impunctate furrow. Mesothoracic sutures faintly traced, complete, ending in a punctiform fovea before the scutellum. Metathorax inclining to rufo-piceous, subrugulose, smoother towards the base. Wings hyaline; radial areolet reaching the extremity; stigma and nervures dull testaceous; stigma elongate, emitting the radius before $\frac{1}{3}$ of its length; 2d cubital areolet elongate, attenuated outwards; podiscoidal areolet incompletely closed; recurrent nervure conspicuously evected. Legs pale testaceous. only the claws dusky. Abdomen ovate, convex, testaceous, gradually infuscated towards the apex, which is nearly black; 1st segment short, black, testaceous at the extreme base, rugulose, of equal width throughout, with visible tubercles just beyond the middle; the other segments smooth and shining. Terebra as long as the two last segments. Male not known. ♀. Length, $\frac{3}{4}$; wings, $2\frac{1}{4}$ lines.

Smaller than *O. cingulatus* and *maculipes* (spp. 20, 19), and distinguished by the large testaceous head, the visible mesothoracic sutures, &c. I captured the only specimen near Nunton, Wilts.

19. *Opius maculipes*, Wesm.

O. maculipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 128; Hal., Ent. Mag., iv., 210, ♂ ♀.

Black; abdomen ♀ testaceous, except the 1st segment; in the ♂ testaceous, with the apex blackish. Face distinctly carinated; clypeus sometimes black at the base, rather widely separated from the mandibles, which are dilated at the base, and gradually diminish to the points. Palpi testaceous. Antennæ longer than the body, 33—35-jointed, under side of the 1st joint and extremity of the 2d more or less rufo-testaceous. Mesothoracic sutures effaced. Mesopleuræ with an impunctate furrow. A punctiform impression before the scutellum. Metathorax finely granulated, dull. Wings hyaline; nervures and stigma fusco-testaceous; stigma elongate-oval, emitting the radius before the middle; 1st abscissa very short, almost punctiform; 3d slightly curved; 2d cubital areolet attenuated outwards; recurrent nervure evected. Legs testaceous, tips of the hind tibiæ fuscescent. Abdomen elongate-oval; 1st segment black, rugulose, smoother at the base; the following segments testaceous; in the ♂ the 3 apical segments are blackish. Terebra subexserted. Length, $\frac{3}{4}$—$1\frac{1}{3}$; wings, $1\frac{1}{3}$—$3\frac{1}{3}$.

Distinguished from *O. cingulatus* (sp. 20) by the fuscescent tips of the hind tibiæ, and the absence of dark margins to the intermediate segments; the 2d cubital areolet is not so much narrowed outwards, and the abdomen is longer and narrower; also the podiscoidal areolet is generally more completely closed, the transverse nervures reaching the bottom, which is hardly the case in *O. cingulatus*. Hence Förster established a new genus *Nosopœa* for the latter species; but the character employed for distinction is often inappreciable, or even reversed, in the two species. *O. maculipes* is one of the commonest in the genus; Wesmael described it from 6 females and 5 males taken in May and June near Brussels. Haliday found a pair on a willow in North Ireland in May, and a ♀ in August near the Shannon; his specimens were smaller than *cingulatus*, ranging from $\frac{3}{4}$ to 1 line, while the Belgian specimens are described as larger; Walker's specimen, taken in England, was the smallest of all. I possess 8 from different parts of the country, and Dr. Reinhard sent me one from Dresden.

20. *Opius cingulatus*, Wesm.

O. cingulatus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 120; Hal., Ent. Mag., iv., 210, ♀ ♀.

Black; 1st abdominal segment black, the rest testaceous with dusky margins. Face faintly carinated; cheeks often testaceous beneath; clypeus short, somewhat raised, not touching the mandibles; both testaceous; palpi very pale. Antennæ longer than the body, 25—35-jointed, black, the 1st joint and end of the 2d testaceous, or the 3 first joints, or more, testaceous; 3d joint more or less elongate. Mesothoracic sutures effaced. Mesopleuræ with an impunctate furrow. A punctiform impression before the scutellum. Metathorax subrugulose, dull, often more or less lævigated towards the base. Wings hyaline; nervures and stigma fusco-testaceous; radial areolet reaching the extremity; stigma elongate, emitting the radius before $\frac{1}{3}$ of its length; 2d cubital areolet elongate, attenuated outwards; podiscoidal areolet imperfectly closed; recurrent nervure evected. Legs testaceous; tips of hind tibiæ not fuscescent, as in the preceding sp. First abdominal segment black, short, usually rugulose towards the apex; the following segments smooth, shining, testaceous, each having a transverse dusky band before the hind margin. Terebra not longer than the last segment. Length, $1\frac{1}{4}$; wings, 3 lines.

Var. 1. The dusky bands on the abdomen widened and coalescing, so that only the 2d segment, or part of it, remains testaceous.

A common species, and difficult to separate from the preceding; see remarks on that species, *ante*. Nevertheless it constitutes by itself the genus *Nosopæa* of Förster. Wesmael's description is taken from 14 Belgian specimens.

21. *Opius irregularis*, Wesm.

O. irregularis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 132; Hal., Ent. Mag., iv., 211, ♂ ♀.

Black; 2d abdominal segment rufo-piceous. Face hardly carinated; clypeus somewhat convex, not touching the mandibles, black with the lower edge sometimes testaceous. Mandibles and palpi testaceous. Antennæ longer than the body, 24—26-jointed, black, with the 1st joint, extremity of the 2d, and sometimes base of the 3d, testaceous. Mesothoracic sutures effaced. Mesopleuræ with an impunctate furrow. A punctiform impression before the scutellum. Metathorax rugulose. Wings hyaline; nervures and

stigma dull testaceous; radial areolet reaching the extremity; stigma narrow, elongate, emitting the radius at ⅓ of its length; 2d cubital areolet elongate, narrow, attenuated outwards; recurrent nervure rejected to a point near the extremity of the 1st cubital areolet, sometimes subinterstitial; podiscoidal areolet open at the extremity. First abdominal segment black, narrow, rugulose; the other segments form, in both sexes, a broad oval, almost circular; 2d segment more or less piceous, sometimes almost black, faintly rugulose on each side at the base; the remaining segments black. Terebra as long as the apical segment. Length, ¾; wings, 2½ lines.

Not uncommon in England and Ireland. Described by Wesmael from 6 Belgian specimens. This species forms the genus *Allotypus* of Förster.

22. *Opius leptostigmus*, Wesm.

O. leptostigmus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 138; Hal., Ent. Mag., iv., 211, ♀.

Black; abdomen, after the 1st segment, rufo-testaceous. Face not carinated; clypeus testaceous at the extremity, which is somewhat rounded, and touches the mandibles, closing the mouth. Mandibles testaceous, deeply emarginate beneath. Palpi pale. Antennæ longer than the body, black with the 1st joint testaceous. Furrow of the mesopleuræ elongate, deeply crenate. Metathorax rugulose. Wings hyaline; radial areolet very long, reaching the extremity of the wing; 1st abscissa elongate, equalling at least the width of the 2d cubital areolet, which is narrower than in other species; stigma dull testaceous, linear, much elongated, emitting the radius somewhat before ⅓ of its length; podiscoidal areolet completely closed; recurrent nervure evected. Legs testaceous. Abdomen oblong, 1st segment forming about ⅓ of its length, widened gradually from the base to the extremity, longitudinally rugulose. Terebra slightly exserted. Male unknown. Length, 1¼ line.

Unknown to me; Wesmael possessed only one specimen, taken near Brussels; and Haliday another, at first confused with *O. cingulatus;* hence its locality was not recorded.

23. *Opius parvulus*, Wesm.

O. parvulus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 139; Hal., Ent. Mag., iv., 211, ♂ ♀.

Black or piceous; 2d abdominal segment sometimes rufescent

at the base. Face faintly carinated; clypeus black, not raised or emarginate, but closing the mouth; mandibles and palpi testaceous, the former not emarginate beneath. ♀. Antennæ black, longer than the body, 21-jointed; 1st joint more or less rufous beneath. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Mesopleuræ impressed with an oval furrow having 4 or 5 striæ or crenations at the bottom. Metathorax smooth. Wings hyaline; radial areolet reaching the extremity; stigma and nervures fuscous, more or less pale; stigma elongate, attenuated; 2d cubital areolet much narrowed outwards; recurrent nervure evected. Legs testaceous or rufous; 4 posterior coxæ blackish above; tips of hind tibiæ, and their tarsi, darkened. Abdomen short-oval, black, or piceous; 1st segment in the ♀ almost smooth. Terebra somewhat longer than the apical segment. The ♂ differs in some respects; antennæ 22-jointed, 1st, 2d, and often base of 3d joint testaceous; clypeus testaceous, as well as the lower part of the face and cheeks; 1st abdominal segment rugulose; only the hind coxæ blackish above. Length, $\frac{1}{2}$—$\frac{3}{4}$; wings, $1\frac{1}{2}$—$2\frac{1}{4}$ lines.

This minute species at first sight resembles an Alysiid of the genus *Aspilota;* it may also be mistaken for *O. pygmæator*, *apiculator*, &c. (spp. 3, 4); it requires a microscope for its determination. I possess a ♀ specimen taken in Leicestershire; Haliday seems to have had a greater number, and Wesmael speaks of 7 taken near Brussels. This species forms the genus *Desmiostoma* of Förster.

24. *Opius docilis*, Hal.

O. docilis, Hal., Ent. Mag., iv., 211, ♂.

Black; base of the 1st abdominal segment piceous, and of the 2d testaceous; apex of cheeks, prothorax, and lateral sutures of the mesothorax, rufo-piceous. Face carinated; clypeus and mandibles testaceous, the latter emarginate at the base beneath; clypeus not touching the mandibles. Antennæ longer than the body, 31-jointed, black with the scape testaceous. Mesothoracic sutures effaced. No punctiform impression before the scutellum. Mesopleuræ with a rugose furrow. Metathorax rugulose. Wings hyaline; stigma and nervures fuscous; stigma broader than that of *O. pactus* (sp. 27), narrowly triangular; 1st abscissa of the radius effaced by the stigma; 2d cubital areolet longer than in sp. 27, very little attenuated outwards; podiscoidal areolet closed; recurrent nervure evected; no pobrachial transverse nervure in the

hind wings. Legs testaceous. First abdominal segment rugulose. Female unknown. Length, nearly 1 line.

Unknown to me; taken once only by Haliday on the banks of the Shannon, in autumn.

25. *Opius nitidulator*, Nees. (Pl. II., fig. 5, wing).

Bracon nitidulator, Nees, Mon., i., 56; *O. nitidulator*, Hal., Ent. Mag., iv., 213, ♂.

Variable; black, diversified with rufous. ♀. Head rufous, with a large black spot covering the occiput and extending over the vertex to the base of the antennæ. Mandibles emarginate at the base, fuscous at the points. Clypeus not reaching the mandibles. Palpi dull rufous. Antennæ as long as the body, 28-jointed, filiform, black, scape and base of 1st joint of flagellum rufous. Prothorax black beneath, rufous above. Mesothorax smooth and shining, rufous, with large oblong black spots on the 3 lobes, whereof the middle one is abbreviated posteriorly. Mesothoracic sutures indicated by two humeral depressions, effaced posteriorly. Scutellum rufous, its transverse basal fovea black, crenulated. A punctiform impression before the scutellum. Mesopleuræ with a crenate furrow. Metathorax coarsely rugose. Wings subhyaline; squamulæ testaceous; stigma and nervures fuscous; stigma elongate-triangular, attenuated outwards, emitting the radius before the middle; radial areolet ending acutely on the fore border of the wing, at some distance from the extremity (as in *ochrogaster*, sp. 17); 2d cubital areolet much attenuated outwards; 1st abscissa of the radius as long as the 2d intercubital nervure; recurrent nervure erected; hind wings broad, with all the nervures distinct. Legs short, stout, rufo-testaceous; a blackish spot at the base of the hind coxæ; tarsi infuscated, except at the base. Abdomen oblong, depressed, as long and as wide as the head and thorax; 1st segment coarsely rugose, short, broad, excavated at the base; the following segments smooth, thinly beset with fine pale hairs; 2d and 3d segments dark rufous (in my specimen), with the hinder margins indeterminately black. Terebra concealed. ♂. Similar, with some slight differences:—Antennæ longer, 34-jointed; clypeus black at the base, or at the hinder angles. Mesothoracic sutures indicated by 4 red lines, of which the 2 inner ones are united posteriorly to each other, and anteriorly to the 2 lateral lines. Scutellum black. Abdomen longer and narrower than that of the ♀; segments 2—3 nigro-piceous. The colours probably vary in different individuals. Length, $1\frac{1}{2}$—$1\frac{3}{4}$; wings, $3\frac{1}{2}$ lines.

Unknown to Wesmael; Nees v. Esenbeck and Haliday each possessed a ♂, taken by the former on a cherry-tree at Sickershausen, and by the latter among willows in North Ireland. I have captured both sexes, the ♂ in Leicestershire, the ♀ at Bishop's Teignton, in Devonshire. Dr. Capron, I believe, has found the species at Shiere, near Guildford. This rare insect differs considerably from all the preceding, approaching *Biosteres* and *Diachasma* in size and general appearance, though not in the wings.

26. *Opius æthiops*, Hal.

O. æthiops, Hal., Ent. Mag., iv., 212, ♂.

Black; palpi short, fuscous; mandibles rufous; clypeus not reaching the mandibles. Antennæ black, as long as the body, 21-jointed. Mesothoracic sutures inchoate, effaced posteriorly. Mesopleuræ with a crenate furrow. A punctiform impression before the scutellum. Metathorax rugulose, smooth and shining in the middle. Wings hyaline; stigma and nervures fuscous; stigma narrow, almost linear; radial areolet ending before the extremity of the wing; 2d cubital areolet elongate, hardly attenuated outwards; podiscoidal areolet imperfectly closed; recurrent nervure evected; pobrachial transverse nervure of the hind wings inchoate. Legs piceous, base of all the tibiæ, and apex of the fore femora, paler. First abdominal segment sublinear, punctulate; the following segments smooth. Female unknown. Length, $\frac{4}{5}$ line.

Unknown to me. No locality is given by Haliday. Similar at first sight to the ♂ of *pygmæator* (sp. 3), but different in sculpture, having more transparent wings, a smaller radial areolet, and a longer 2d cubital.

27. *Opius pactus*, Hal.

O. pactus, Hal., Ent. Mag., iv., 212, ♀.

Black; base of 2d abdominal segment rufo-testaceous. Mandibles rufo-testaceous. Clypeus not reaching the mandibles. Antennæ rather longer than the body, 29-jointed, black, the scape rufo-testaceous. Mesothoracic sutures inchoate, effaced posteriorly. Mesopleuræ with a crenate furrow. A punctiform impression before the scutellum. Metathorax dull, rugose. Wings like those of *spretus* (sp. 7), but broader, and having the 2d cubital areolet less attenuated outwards; stigma narrow, linear-lanceolate; 1st abscissa of the radius very short, but distinct; recurrent nervure

evected. No pobrachial transverse nervure in the hind wings. Legs rufo-testaceous. First abdominal segment rugose, dull, with 2 basal carinæ. Terebra subexserted. Male unknown. Length, 1 line.

No habitat given. The description is probably insufficient to identify the species.

28. *Opius æmulus*, Hal.

O. æmulus, Hal., Ent. Mag., iv., 212, ♀.

Black; base of the 2d abdominal segment testaceous, the following segments fuscous. Clypeus and mandibles testaceous, the former narrowly separated from the latter. Antennæ slender, longer than the body, 27-jointed, testaceous, fuscous towards the apex; the joints elongate, as in *pallidipes* (sp. 10). Mesothoracic sutures inchoate, effaced posteriorly. A punctiform impression before the scutellum, Mesopleuræ with a narrow furrow, crenulate at the bottom. Metathorax minutely rugulose. Wings hyaline; radial areolet almost reaching the extremity; stigma very narrow, elongate, dull testaceous; recurrent nervure evected. Legs flavo-testaceous. First abdominal segment linear, rugulose. Terebra almost as long as ¼ of the abdomen, perhaps accidentally protruded. Male unknown. Length, 1 line.

This species, now unknown, is compared by Haliday to *pallidipes*, from which it differs chiefly by the oral aperture, and the crenulate furrow of the mesopleuræ. Only one specimen occurred, the locality of which is not given. Compare the following species.

29. *Opius zelotes*, n. sp.

♂. Niger, nitidus, abdominis segmento 2do interdum basi supra picescente; orbitis et genarum apice nonnunquam rufis. Facies subtiliter punctulata, vix nitida, convexa, non carinata; clypeus brevis, transversus, elevatus, a mandibulis longius distans; clypeus cum mandibulis testaceus; hæ apice nigræ; palpi testacei. Antennæ corpore multo longiores, 37—38-articulatæ, nigræ, scapo sordide rufo. Mesothoracis sulculi inchoati, posterius deleti. Foveola oviformis præ scutello. Mesopleuræ sulco lato irregulariter crenato impressæ. Metathorax rugulosus basi læviuscula. Alæ hyalinæ stigmate, nervis, fuscis, squamula testacea; stigma elongatum, triquetrum, radium e dimidio priore emittens; areola radialis usque ad apicem alæ extensa; abscissa 3tia curvata; areola cubitalis 2da extus perparum attenuata; nervus recurrens

evectus; areola podiscoidalis occlusa. Alarum inferiorum nervus transversus pobrachialis omnino nullus. Pedes flavidi, tarsorum articulo ultimo obscuro. Abdomen ovale, segmento 1mo ruguloso, brevi, lineari, bicarinato, tuberculis conspicuis; segmenta cætera lævissima. Femina latet.

♂. Black, smooth and shining, 2d abdominal segment sometimes slightly piceous at the base; orbits and apex of cheeks occasionally rufous. Face minutely punctulate, hardly shining, convex, not carinated; clypeus short, transverse, elevated, not nearly touching the mandibles; clypeus and mandibles testaceous, the latter black at the points; palpi testaceous. Antennæ much longer than the body, 37—38-jointed, black; scape dull rufous. Mesothoracic sutures inchoate, effaced posteriorly. An oval impression before the scutellum. Mesopleuræ with a wide furrow, irregularly crenate. Metathorax rugulose, smoother at the base. Wings hyaline; stigma and nervures fuscous; squamula testaceous; stigma elongate, triangular, emitting the radius before the middle; radial areolet reaching the apex of the wing; 3d abscissa curved; 2d cubital areolet very slightly attenuated outwards; recurrent nervure evected; podiscoidal areolet closed. Hind wings with no vestige of a pobrachial transverse nervure. Legs flavo-testaceous; apical joint of tarsi dusky. Abdomen ovate; 1st segment rugulose, short, linear, bicarinated, with visible tubercles; the rest very smooth and shining. Female unknown. Length, 1½; wings, 4 lines.

A large species, which would be a *Biosteres* if the 2d cubital areolet were less prolonged. It nearly approaches the preceding species, *æmulus*, but the size is much greater, and the antennæ have too many joints, even when allowance is made for the difference of sex; it is hardly probable, therefore, that this can be the unknown ♂ of *æmulus*. I have three specimens from Devonshire, one of which was taken by Bignell, the others by myself at Cornworthy.

30. *Opius polyzonius*, Wesm.

O. polyzonius, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 136; Hal., Ent. Mag., iv., 213, ♀.

Black; mouth, orbits of the eyes, prothorax and abdomen, rufo-testaceous; 1st segment black, the rest margined with fuscous posteriorly. Head testaceous; middle of the front and of the vertex, occiput, and margins of the cheeks, black. Clypeus rufo-

testaceous, not touching the mandibles. Palpi testaceous. Antennæ longer than the body, black, with the 1st joint and the extremity of the 2d testaceous. Mesothoracic sutures inchoate, effaced posteriorly. Furrow of the mesopleuræ deeply crenulate. A punctiform impression before the scutellum. Metathorax rugulose. Wings hyaline; nervures and stigma fusco-testaceous; radial areolet almost reaching the extremity of the wing; stigma narrow, elongate, emitting the radius at about ⅓ of its length; 1st abscissa longer than the thickness of the stigma; 3d slightly curved; 2d cubital areolet elongate, hardly attenuated outwards; podiscoidal areolet closed; recurrent nervure evected. Pobrachial transverse nervure of the hind wings inchoate. Legs testaceous. First abdominal segment black, rugulose. Terebra subexserted. Male not described. Length, 1¼ line.

Wesmael and Haliday had each a single specimen. I possess a ♂ from Walker's collection supposed to be of this species, but it is in too bad a condition to be described; its antennæ are 32-jointed.

31. *Opius ruficeps*, Wesm.

O. ruficeps, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 143, ♀, pl. ii., fig. 9 (wing); 1838, p. 146, ♂.

♀. Form robust; black, head rufous, except the stemmaticum. Clypeus remote from the mandibles, and like them, rufo-testaceous; palpi dusky; face strongly carinated. Antennæ longer than the body, 34-jointed, the joints short; black, 1st joint testaceous. Mesothoracic sutures deeply impressed. Furrow of the mesopleuræ strongly crenated. Metathorax rugose. Wings infumated as far as the stigma, thence to the extremity hyaline; stigma and nervures blackish; radial areolet reaching the extremity of the wing; 2d cubital areolet moderately attenuated outwards; stigma broad, oval, emitting the radius somewhat beyond the middle; 2d abscissa a little longer than the 1st intercubital nervure; podiscoidal areolet completely closed; recurrent nervure evected. Hind wings with a radius faintly traced but discernible; no pobrachial transverse nervure. Legs rufo-testaceous; all the tarsi, and base of the hind coxæ, black. Abdomen short, broad, subcircular; 1st segment mostly rugose, with an unequal surface, somewhat shining, bicarinate at the base, the carinæ converging posteriorly. Terebra not surpassing the anus. ♂. Similar; abdomen narrower, less rounded at the sides. Length, 1½ line.

Wesmael discovered both sexes in Belgium; and I

believe Dr. Capron has met with the species in his neighbourhood. It forms the genus *Therobolus*, Först. According to Brischke (Schr. Nat. Ges. Danzig, 1878, p. 108) it has been bred from the maggots of *Pegomyia conformis*, Fall. The ambiguous character of the wings would allow this species to enter the genus *Diachasma*, if it were not that the 2d abscissa is a little too long.

32. *Opius bajulus*, Hal.

O. bajulus, Hal., Ent. Mag., iv., 214, ♂.

♂ ♀. Black, shining. Face punctulate, with an indistinct carina; clypeus not touching the rufous mandibles; palpi fuscous. Antennæ longer than the body, 29-jointed in both sexes, black with the scape reddish. Mesothoracic sutures meeting in a linear fovea before the scutellum, which is gibbous, flattened at the top, finely margined and transversely rugulose; its cancellated basal fovea is rather large. Mesopleuræ with a crenate furrow. Metathorax rugulose. Wings hyaline; squamula piceous; nervures and stigma fuscous; radial areolet ending rather obtusely before the extremity of the wing; stigma elongate, lanceolate, emitting the radius before ⅓ of its length; 2d cubital areolet as long as the 3d, not attenuated outwards; recurrent nervure conspicuously evected. Hind wings with an inchoate pobrachial transverse nervure. Legs rufo-testaceous; coxæ black. Abdomen ovate, acuminate behind; 1st segment obconic, short, striolated; the rest very smooth and shining. Terebra concealed. The sexes are similar. Length, 1—1¼; wings, 2¾—3½ lines.

Haliday had for description the broken remains of a ♂ taken by Walker in King's Wood, Hampton; two ♀ specimens are in my collection, captured in a wood near Nunton, in Wilts. The rugosity of the scutellum and the black coxæ make the species easy to identify; the former character is repeated in several species of *Biosteres*. *O. bajulus* forms the genus *Biophthora*, Först.

33. *Opius truncatus*, Wesm.

O. truncatus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 137; Hal., Ent. Mag., iv., 214, ♂ ♀.

Black; clypeus, mandibles, and palpi, testaceous. Face distinctly carinated; clypeus not touching the mandibles. Antennæ longer than the body, 38—39-jointed, black with the 1st joint testaceous. Anterior margin of the mesonotum abruptly truncate,

terminated on each side by an angle, above which is a rather deep fovea indicating the commencement of the mesothoracic sutures. An oblong fovea before the scutellum. Mesopleuræ with a crenate furrow. Metathorax somewhat rugose, with two small parallel approximated ridges near the extremity. Wings hyaline; stigma and nervures fuscous; stigma subtriangular, not much elongated, emitting the radius just before the middle; radial areolet rather narrowed outwards, yet reaching the extremity of the wing; 2d cubital areolet much attenuated outwards; podiscoidal areolet completely closed; recurrent nervure evected. Hind wings with no vestige of the præbrachial transverse nervure. Legs testaceous. Abdomen short, oval, subcircular; 1st segment without rugosity, shining, almost smooth, much widened from the base to the extremity, the disk elevated; at the base are two carinæ, which become effaced before the middle. Terebra subexserted. Length, $1\frac{1}{2}$; wings, $3\frac{1}{2}$ lines.

Very similar to *reconditor* (sp. 36), but different in the angular gibbosity of the mesothorax, in size, and in the number of joints of the antennæ. Wesmael described a pair found near Brussels; I have captured a ♀ in Yorkshire; the London district, Windsor, and the I. of Wight are other localities mentioned by Haliday.

34. *Opius rudis*, Wesm.

O. rudis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 141; Hal., Ent. Mag., iv., 214, ♂ ♀.

Black; orbits of the eyes, and base of 2d abdominal segment, rufous. Head minutely rugulose, not shining; occiput smooth above; clypeus not touching the mandibles, elevated, rounded anteriorly, rufo-testaceous like the mandibles; palpi testaceous. Antennæ a little longer than the body, 28—29-jointed. Mesothorax minutely rugulose, dull on the sides, more shining on the disk; sutures distinct, crenulate. Mesopleuræ impressed with a wide fovea, rugose or crenate at the bottom. Metathorax rugose. Wings hyaline; nervures and stigma fuscous; the latter linear-lanceolate; radial areolet reaching the extremity of the wing; 2d cubital areolet much attenuated outwards; podiscoidal areolet not completely closed; recurrent nervure evected in the ♀ (? interstitial in the ♂). Hind wings with no vestige of the præbrachial transverse nervure. Legs rufo-testaceous, tarsi dusky. Abdomen short, suborbicular; 1st segment black, rugose; 2d sometimes wholly black, but generally more or less rufo-testaceous on its

basal half, which is covered with minute and close punctuation, visible only under a good lens; in the ♂ the 2d segment is more often wholly black. Terebra subexserted. Length, 1—1¼ line.

I have not seen this species, which is described by Wesmael from 8 females and 1 male. That author expresses a doubt as to the specific identity of two additional males, which differed (1) in having a distinct carina on the upper part of the face; (2) the face, and sides of the thorax, more shining, and with less rugosity; (3) the tubercles of the 1st abdominal segment very prominent; and (4) the radial areolet rather longer. According to Haliday a specimen of *O. rudis* was taken by Walker in the London district.

35. *Opius cæsus*, Hal.

O. cæsus, Hal., Ent. Mag., iv, 215, ♂ ♀.

Black, hardly shining, vaguely punctulate, pubescent; 2d abdominal segment finely rugulose. Face subcarinate; clypeus widely separated from the testaceous mandibles. Antennæ 21—24-jointed, those of the ♀ as long as the body, of the ♂ longer. Mesothoracic sutures faintly traced, punctulate, not meeting behind; humeral angles somewhat prominent. Mesopleuræ with a wide rugose furrow. Metathorax rugulose. Wings hyaline; squamula piceous; nervures and stigma fuscous; stigma very much attenuated; 2d cubital areolet hardly attenuated outwards; recurrent nervure evected. Hind wings with no vestige of the præbrachial transverse nervure. Legs elongate, testaceous; apex of the 4 posterior femora and of their tibiæ, or almost the whole of the tibiæ, fuscous, as well as the tarsi; sometimes the legs are altogether testaceous. Abdomen ♀ broadly ovate, subdepressed; narrower in the ♂; 1st segment short, broadly obconic, gibbous, rugulose, with 2 basal carinæ; 2d segment broadly and minutely rugulose or scabrous, obliquely impressed on each side of the base, the impressions joining to form an arc. Terebra subexserted. Length, ¾—1 line.

According to Haliday, found rarely in damp meadows of England and Ireland.

36. *Opius reconditor*, Wesm.

O. reconditor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 134; Hal., Ent. Mag., iv., 213, ♂ ♀.

Black; face carinated; clypeus black in the ♀, rufo-testaceous

in the ♂, not touching the mandibles; palpi and mandibles rufo-testaceous. Antennæ longer than the body, 28—35-jointed, black, with the scape testaceous. Mesothoracic sutures indicated by two smooth foveæ, not completed posteriorly. A punctiform impression, sometimes elongated, before the scutellum. Mesopleuræ with a rather deep oblong fovea, more or less crenulate or unequal at the bottom. Metathorax rugose. Wings hyaline; squamula flavo-testaceous; nervures and stigma fuscous, the latter elongate-triangular or lanceolate, proportionally broader in large specimens; radial areolet reaching the extremity of the wing; 2d cubital areolet short, much attenuated outwards; podiscoidal areolet closed; recurrent nervure evected. Legs flavo-testaceous; coxæ very pale. Abdomen of the ♀ suborbiculate, oblong in the ♂; 1st segment rugulose; 2d usually piceous towards the base. Terebra not surpassing the anus. Length, 1—1½; wings, 2¾—3⅔ lines.

Var. 1. Basal half, or more, of 2d abdominal segment testaceous, ♂ ♀.

Var. 2. Like the preceding; but the prothorax is testaceous, the humeral angles of the mesothorax obscurely testaceous, and the clypeus rufous, like the mandibles, ♀.

Var. 3. Like Var. 1, but with the face, orbits, clypeus, and hind margins of the posterior abdominal segments, testaceous.

A common species in Belgium; Wesmael's description was derived from 20 specimens. Haliday received several from Walker, collected in the London district, and belonging to var. 3; the two which I possess are from Yorkshire and the New Forest; they have the colouring of Wesmael's types.

37. *Opius cælatus*, Hal.

O. cælatus, Hal., Ent. Mag., iv., 216, ♂.

Black; head oblate, punctate; occiput smooth; face rugulose, subcarinate; clypeus separated from the mandibles by a wide semicircular interval; mandibles testaceous; palpi pale, elongate. Antennæ much longer than the body, 41-jointed, blackish, scape more or less rufous. Thorax longer than usual, thickly punctulate, somewhat dull. Mesothoracic sutures complete; a smooth space on each of the lateral lobes, the medial lobe vaguely punctate. Mesopleura with a crenate furrow. Wings hyaline; squamula rufo-testaceous; nervures fuscous; stigma fusco-testaceous, narrow, linear, emitting the radius before ⅓ of its length; 2d cubital areolet not attenuated outwards; recurrent nervure conspicuously rejected. Præbrachial transverse nervure of the hind wings

distinct. Legs testaceous; apex of hind tibiæ, and their tarsi, fuscous. Abdomen oblong; 1st segment elongate, linear, finely rugulose; the following segments very smooth. Female unknown. Length, 2; wings, 4¼ lines.

Haliday was acquainted with a single specimen, sent to him from England; I possess another, taken near Barnstaple, in bad condition.

38. *Opius testaceus*, Wesm.

O. testaceus, Wesm., Nouv. Mém. Ac. Brux., 1838, p. 146, ♂ ♀. (Pl. II., fig. 6, ♀).

Bright testaceous; ♀ clypeus not touching the mandibles, which are black at the points. Antennæ a little longer than the body, 38-jointed, black, the scape testaceous. Mesothoracic sutures distinct, impunctate, ending in a punctiform impression before the scutellum. Metathorax rugulose. Wings subhyaline; nervures fusco-testaceous; stigma large, elongate, ovate, blackish or fuscous, with the extremity paler; radial areolet not quite reaching the extremity of the wing; 1st abscissa shorter than the thickness of the stigma; 2d cubital areolet elongate, attenuated outwards; recurrent nervure interstitial or subevected; podiscoidal areolet closed, nearly as large as the prædiscoidal. Legs testaceous; last joint of the tarsi blackish. Abdomen oval, convex; 1st segment broad, the disk elevated, with two longitudinal ridges, and a few intermediate striæ. Terebra as long as the abdomen, its valves black, filiform. ♂. Similar; antennæ half as long again as the body, 39-jointed. Length, 1¾—2; wings, 4—4½ lines.

Five specimens, including a ♂, were captured near Liége and Brussels, and described in Wesmael's Supplement. The species was not known to Haliday, and I believe it was first noticed in this country by myself. I obtained 5 or 6 of both sexes at the same place and time. They were beaten out of a dusty hedge, bordering the great north road, about two miles from St. Albans. This species constitutes the genus *Utetes*, Först.; it is remarkable for its colour, and the length of the terebra, but I am not able to discover any characters important enough to be considered generic. A closely allied species exists in N. America, specimens of which were sent to me from the Washington Museum, under the MS. name *Phædrotoma sanguinea*, Ashmead.

39. *Opius rufipes*, Wesm.

O. rufipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 147; Hal., Ent. Mag., iv., 216, ♂.

Black; 2d abdominal segment more or less rufous. Face carinated; clypeus testaceous at the extremity, not touching the mandibles, which are rufous, as well as the palpi. Antennæ ♀ about one-half longer than the body, 36—37-jointed, all the joints short, the scape rufescent; antennæ of the ♂ 38—42-jointed. Mesothoracic sutures indicated by two smooth humeral impressions, effaced before reaching the middle of the disk. A subcircular fovea before the scutellum. Mesopleuræ with a crenulate furrow. Metathorax short, rugose. Wings hyaline; radial areolet nearly reaching the extremity; stigma and nervures fuscous; stigma somewhat elongate-oval, acute at the apex, emitting the radius exactly from the middle; 2d cubital areolet elongate, attenuated outwards; recurrent nervure rejected (in 4 females), interstitial according to Wesmael (in 2 males). Nervures of the hind wings distinct; præbrachial transverse nervure semicomplete. Legs rufo-testaceous; tarsi sometimes fuscescent. Abdomen oval; 1st segment broad, short, rugose, black; 2d and following segments smooth, shining; 2d usually more or less piceous or rufescent at the base, but sometimes quite black, and in one specimen entirely rufo-testaceous. Terebra not surpassing the anus, directed upwards. Length, 1—1¾; wings, 2⅓—4 lines.

The recurrent nervure is interstitial in the left wing of one ♂, in the right wing it is plainly rejected, and in both wings of my other specimens. Among the larger *Opii* this species may be known by the radius originating from the middle of the stigma. It is stated by Haliday to be very rare in North Ireland; it is not common in England, but has been found by Walker in the London district, by Capron at Shiere, and by me at Cornworthy, in Devonshire. According to Ratzeburg (Ichn. d. Forst., ii., 62), it was bred by Bouché from the lepidopterous *Coleophora nigricella*, Ste. Wesmael described an *O. caudatus* (*lib. cit.*, p. 142), which he was inclined to regard as the ♀ of this species; the terebra of *caudatus* was half as long as the abdomen, the facial carina more acute, and the mesothoracic sutures more rudimentary. This was probably not the true ♀ of *rufipes*, and I feel certain that the sexes above described belong to each other; they correspond in all respects, and were captured under the same circumstances.

40. *Opius comatus*, Wesm.

O. comatus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 145, pl. ii., fig. 7 (wing); Hal., Ent. Mag., iv., 215, ♂ ♀.

♀. Black; head thinly beset with long hairs; face strongly carinated, piceous or sometimes testaceous in the middle, slightly rugulose; clypeus rounded in front, separated from the mandibles by a semicircular interval; palpi pale, elongate. Antennæ about as long as the body, 21—23-jointed, testaceous towards the base, the joints fusco-punctate at the apex, the terminal joints fuscous; 3d joint elongate. Mesothoracic sutures distinct, punctate, converging to a point before the scutellum, which is sometimes testaceous at the apex. Mesopleuræ with a deeply crenate furrow. Metathorax somewhat elongate, rugose, reticulated. Wings dull hyaline; squamula testaceous; nervures and stigma fusco-testaceous, the former very slender; radial areolet reaching the extremity of the wing; 2d cubital areolet hardly or not at all attenuated outwards; stigma narrow, lanceolate, emitting the radius from the middle; recurrent nervure interstitial; podiscoidal areolet subincomplete. Præbrachial transverse nervure of the hind wings inchoate. Legs testaceous; last joint of the tarsi blackish. Abdomen obovate, subdepressed; 1st segment rather long, obconic, rugulose, subcarinate in the middle, without visible tubercles; 2d segment sometimes faintly striated at the base; suturiform articulation marked by an indistinct channel, which is often testaceous; 3d and following segments black, shining. Terebra subexserted.

♂. Antennæ much longer than the body, slender, 29—31-jointed, testaceous towards the base; 3d joint very long. Head, including the oral parts, testaceous; stemmaticum and occiput fuscous. Prothorax testaceous, obscure on the sides. Under the base of the fore wings is often a dull testaceous spot, and another on the mesonotum; the mesothoracic sutures marked by two testaceous lines. Tubercles of the 1st abdominal segment more distinct than in the ♀; a large or small testaceous spot on the 2d segment. Length, ¾—1; wings, 2¼—3 lines.

Var. 1. Head and clypeus black; 3 apical segments of the abdomen rufo-testaceous. Wesmael.

Described by Wesmael from 4 females and 7 males, taken near Brussels. According to Haliday it is somewhat rare in shady groves of England and Ireland. I have captured several females, and Bignell a ♂, in Devonshire. This species forms the genus *Holconotus* of Förster.

vi. Biosteres, *Förster*.

Först., Verh. pr. Rheinl., 1862, p. 259.

Clypeus reaching the mandibles and closing the mouth, except in *B. placidus*, Hal. Second cubital areolet, measured horizontally, shorter than in *Opius*, the 2d abscissa of the radius not exceeding in length the 1st intercubital nervure; stigma narrow, elongate, emitting the radius from the middle, or from a point just before the middle. The other characters are those of *Opius*. In *Diachasma* the clypeus does not reach the mandibles, and the stigma is shorter and thicker, emitting the radius generally from a point beyond the middle.

Ten British species may be assigned to the genus *Biosteres*; they include the largest of the present subfamily, and have a superficial resemblance to the Alysiids, especially of the genus *Phanocarpa*. They have a certain facies which distinguishes them from *Opius* without the aid of artificial characters; but closer examination shows that this difference is mainly dependent upon size, and that their structure presents hardly any modification.

Table of Species.

(18)	1. Clypeus reaching the mandible and closing the mouth.	
(5)	2. Mesopleuræ with a smooth impunctate furrow.	
(4)	3. Abdominal segments 2—4 black, hard, and shining	1. *carbonarius*, Nees.
(3)	4. Abdominal segments 2—4 fusco-testaceous, with a soft cuticle which shrinks after death, leaving transverse impressions upon the abdomen	2. *impressus*, Wesm.
(2)	5. Mesopleuræ with a crenate or rugose furrow.	
(7)	6. Scutellum smooth	3. *bicolor*, Wesm.
(6)	7. Scutellum rugulose or punctate, at least at the apex.	
(11)	8. Abdomen partly rufous.	
(10)	9. Scutellum entirely rugulose	4. *hæmorrhoïs*, Hal.
(9)	10. Scutellum punctate at the apex	5. *blandus*, Hal.
(8)	11. Abdomen entirely black.	
(13)	12. Scutellum punctate at the apex	6. *rusticus*, Hal.
(12)	13. Scutellum entirely rugulose.	
(15)	14. Vertex rugulose, dull; 3 longitudinal bands of similar rugosity on the mesothorax	7. *scabriculus*, Wesm.

(14) 15. Vertex and mesothorax smooth, shining.
(17) 16. Third abscissa of the radius straight, or with only a very slight bend at the extremity .. .. 8. *Wesmaëlii*, Hal.
(16) 17. Third abscissa of radius curved, concave beneath .. .. 9. *sylvaticus*, Hal.
(1) 18. Clypeus not reaching the mandibles, mouth open .. .. 10. *placidus*, Hal.

1. *Biosteres carbonarius*, Nees. (Pl. II., fig. 7, ♂).

Bracon carbonarius, Nees, Mon., i., 58; *Opius carbonarius*, Hal., Ent. Mag., iv., 218, ♂ ♀.
Opius procerus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 156, ♂, pl. ii., fig. 12 (wing).

Black, shining; face punctate, with a strong carina; clypeus touching the mandibles, punctate, testaceous; palpi and mandibles testaceous, the latter broad, fuscous at the points. Antennæ much longer than the body, 43—44-jointed, ♂ ♀; black, with the under side of the scape testaceous. Mesothoracic sutures inchoate, effaced posteriorly. Mesopleuræ with a smooth impunctate furrow. Apex of the scutellum rugulose; before it is an oblong fovea. Metathorax rugulose. Wings hyaline; nervures fuscous; stigma paler fuscous, elongate, attenuated, emitting the radius just before the middle; 1st abscissa as long as the thickness of the stigma; 2d as long as the 1st intercubital nervure; 3d slightly curved, ending near the extremity of the wing; recurrent nervure evected. No vestige of a pobrachial transverse nervure in the hind wings. In the ♂ all the principal nervures of the fore wings are incrassated and darker. Legs testaceous; 2d joint of all the trochanters often rufescent; tips of the tarsi dusky; hind coxæ of the ♂ sometimes black at the base above. Abdomen oblong-ovate, broader in the ♀; 1st segment short, forming a truncated triangle, narrower in the ♂, rugulose, with a medial carina, which is bifurcate at the base, and a fovea on each side of the apex; the other segments smooth and shining. Terebra concealed. Length, 2—2½; wings, 4¾—5¾ lines.

Generally distributed throughout the country, and more often met with than the other species, yet by no means common. Bred, according to Brischke (Schr. Nat. Ges. Danzig, 1878, p. 107), from the maggots of *Pegomyia nigritarsis*, Zett.

2. *Biosteres impressus*, Wesm.

Opius impressus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 157, ♂; Hal., Ent. Mag., iv., 218, ♂ ♀.

Rather smaller than the preceding, but with absolutely the same characters, except as regards the abdomen. The posterior half of the 2d, 3d, 4th, and 5th segments is marked (in dried specimens) with a deep transverse depression, which is dull testaceous. In the living insect there are no depressions, but testaceous bands, covered with a soft integument, which subsides irregularly after death. ♂ ♀. Length, 2—2¼; wings, 4¾—5½ lines.

Not common; taken by Wesmael in Belgium, by Haliday in North and West Ireland, and by Walker in England. I captured 5 specimens at Cornworthy, in South Devon, and another in Wiltshire.

3. *Biosteres bicolor*, Wesm.

Opius bicolor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 151, ♂; Hal., Ent. Mag., iv., 220, ♂ ♀.

Black; abdomen, after the 1st segment, rufous. Face carinated; clypeus reaching the mandibles, its lower half testaceous, impressed in the middle with a transverse series of punctures; mandibles testaceous; palpi about as long as the head, testaceous. Antennæ ♂ longer than the body, 39-jointed, black; 1st joint rufo-testaceous beneath; all the joints short; antennæ ♀ not described. Mesothoracic sutures indicated by a short deep depression on each side of the mesothorax in front. Furrow of the mesopleuræ very superficial, formed of a series of slight transverse wrinkles. Metathorax finely rugulose. Wings hyaline; stigma dull rufo-testaceous; radial areolet reaching the extremity of the wing; 2d cubital areolet narrow; podiscoidal areolet complete. Legs rufo-testaceous. First abdominal segment black, rather shining, with a few longitudinal striæ; the rest of the abdomen smooth, rufo-testaceous. Terebra concealed. Length, 1—1¼ line.

Only two examples seem to have occurred, a ♂ taken by Wesmael near Brussels, and a ♀ in North Ireland by Haliday; as the latter writer gives no description of the ♀, it may be presumed that the sexes are similar.

4. *Biosteres hæmorrhoüs*, Hal. (Pl. II., fig. 8, ♀).

Opius carbonarius, var. 2, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 152, ♂ ♀.
O. hæmorrhœus, Hal., Ent. Mag., iv., 219, ♂ ♀; and 204, figs. *a*, *b*, ♂.

Black; posterior half of the abdomen rufous. Clypeus testaceous, touching the mandibles (*cf.* Hal., *l. c.*, fig. *b*); mandibles testaceous. Antennæ ♀ longer than the body, 41-jointed, scape rufous; antennæ ♂ not described. Mesothoracic sutures inchoate, effaced posteriorly. Scutellum entirely rugulose, preceded by an oblong fovea, which is surrounded by a few punctures. Mesopleuræ with a crenate furrow. Metathorax rugulose, subreticulate. Wings hyaline; squamula rufous; nervures fuscous; stigma fusco-testaceous, elongate, narrow, emitting the radius just before the middle; 1st abscissa as long as the 2d and much longer than the thickness of the stigma; 2d abscissa much shorter than the 1st intercubital nervure; 3d slightly curved, ending somewhat before the extremity of the wing; recurrent nervure slightly evected. Hind wings with no trace of a pobrachial transverse nervure. Legs rufo-testaceous, tarsi infuscated. Abdomen ♀ ovate, convex, black from the base to the suturiform articulation, the remainder rufous; 1st segment short, broad, striated, margined, with visible tubercles; the following segments smooth and shining. Terebra concealed. ♂. Second abdominal segment rufous towards the apex, 3d rufous on each side of the base; less frequently the 2d segment is rufous only on the sides, and the 3d entirely black. Length, 2; wings, 5 lines.

Var. 1. Stigma fuscous; 2d segment at the extremity, and the following segments, rufo-piceous, banded with black.

This fine species is quite distinct from *carbonarius*, Nees (sp. 1), and more resembles *Wesmaëlii*, Hal. (sp. 8); it is, however, much larger, and distinguished by the colours of the abdomen; the 1st abscissa of the radius is also much longer in proportion. Wesmael captured many specimens near Charleroi and Brussels; Walker found both sexes in the London district; and Haliday a ♀ on a willow in North Ireland; a ♀ is in my collection, which was taken near St. Albans.

5. *Biosteres blandus*, Hal.

Opius blandus, Hal., Ent. Mag., iv., 220, ♂ ♀.

♀. Black; abdomen partly rufous. Head very broad, rufous, orbits and cheeks more obscure, stemmaticum black; face punctate, with a medial carina; clypeus hairy, rufous, touching the mandibles; palpi rather short, testaceous. Antennæ shorter than the body, black, the scape rufous beneath. Thorax smooth and shining; mesothoracic sutures inchoate. Scutellum coarsely punctate at the apex, preceded by a small fovea. Mesopleuræ with a wide cancellated furrow. Metathorax rugulose, smoother in the middle. Wings hyaline; squamula testaceous; nervures fuscous; stigma fusco-testaceous, emitting the radius nearly in the middle. Legs short, rufo-testaceous; femora stout; extreme apex of the hind tibiæ, and their tarsi, fuscous. Abdomen ovate; 1st segment black, hardly narrowed at the base, rugulose, with a longitudinal carina, which is bifurcate at the base; 2d and following segments rufo-piceous; 3d and following segments banded with black. Terebra concealed. ♂. Larger than the ♀, the rufous portions clearer; head rufous, stemmaticum and occiput black; antennæ hardly shorter than the body, 41-jointed; abdomen more oblong, 2d segment rufous, the rest fuscous. Length hardly 2 lines.

Described by Haliday from one ♀ and a few males taken in May on willows in North Ireland. Förster has made of this species a separate genus *Chilotrichia*, on account of the hairiness of the clypeus.

6. *Biosteres rusticus*, Hal.

Opius rusticus, Hal., Ent. Mag, iv., 218, ♀.

Black; clypeus and mandibles testaceous; mouth closed. Antennæ ♂ much longer than the body, slender, 38-jointed, black, the scape rufous; antennæ of the ♀ not described. Prothorax and mesopleuræ vaguely punctate with large punctures; the latter impressed with a rugose furrow. Mesothorax rugulose in front, the sutures subcomplete, punctate. A foveola before the scutellum, which is punctate at the apex. Metathorax rugose. Wings hyaline; squamula rufo-testaceous; stigma and nervures fuscous; stigma very long and narrow, emitting the radius from a point just before the middle; 1st abscissa longer than the thickness of the stigma. Legs testaceous. The rest of the characters are those of *carbonarius* (sp. 1). Length, $1\frac{1}{2}$; wings, $3\frac{1}{2}$ lines.

This is distinguishable from *carbonarius* by its smaller size, the rugose furrow of the mesopleuræ, and the inequalities and rugosity of portions of the thorax; from *scabriculus*, *Wesmaëlii*, and *sylvaticus* (spp. 7, 8, 9), by longer antennæ, the fainter sculpture of the thorax, the longer stigma, the insertion of the radius, and the greater length of the radial areolet. Taken rarely by Haliday in North Ireland on *Brassica rapa*. The specimen I possess is a ♂, found by Bignell in Devonshire.

7. *Biosteres scabriculus*, Wesm.

Opius scabriculus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 154, ♀; Hal., Ent. Mag., iv., 218, ♂ ♀.

Black; head and thorax scabrous; legs varied with black. Head pubescent; face finely carinated, and, together with the greater part of the cheeks and vertex, scabrous, not shining; mandibles rufous; palpi dusky. Antennæ ♀ black, 33-jointed, as long as the body; those of the ♂ not described. Mesothorax with 3 longitudinal scabrous parallel lines on the disk; humeral angles, and sides in front, similarly scabrous. Mesopleuræ with no furrow, but a broad rugulose space instead, hardly depressed below the surface. Scutellum and metathorax rugulose. Wings hyaline; stigma dull testaceous, elongate, narrow, linear. Coxæ and 1st joint of the trochanters black; 2d joint, femora, and tibiæ, rufo-testaceous; 4 anterior femora streaked on the upper edge with blackish; hind femora blackish above and on the sides; tips of hind tibiæ and all the tarsi fuscescent. Abdomen narrow, elongate; 1st segment longitudinally rugose, with a fine medial carina; the following segments smooth and shining; in the ♂ segments 2, 3, 4 are furnished before the apex each with two minute whitish spines. Terebra as long as $\frac{1}{6}$ of the abdomen. Length, $1\frac{3}{4}$ line.

Only two specimens seem to have been taken, a ♀ near Brussels, described by Wesmael, and a ♂ indicated by Haliday, which was sent to him from England, probably from the London district, by Walker.

8. *Biosteres Wesmaëlii*, Hal.

Opius carbonarius, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 152 (partly; not of Nees or Haliday; and not the varieties).

O. Wesmaëlii, Hal., Ent. Mag., iv., 219, ♂ ♀.

Black; face strongly carinated, punctate; clypeus reaching the mandibles, testaceous, sometimes black at the base, punctate; mandibles rufous; palpi testaceous. ♂ ♀. Antennæ longer than the body, 37—39-jointed, black, the scape rufous. Mesothoracic sutures inchoate, effaced posteriorly. An oblong fovea before the scutellum, which is rugulose, like the metathorax. Wings hyaline; squamula testaceous; nervures fuscous; stigma fusco-testaceous, darker in the ♂, emitting the radius from the middle; 1st abscissa not half as long as the 2d, and not longer than the width of the stigma; 2d abscissa and 1st intercubital nervure about equal in length; 3d abscissa straight, ending rather before the extremity of the wing; recurrent nervure slightly evected. No trace of a pobrachial transverse nervure in the hind wings. Legs rufo-testaceous; coxæ sometimes infuscated at the base above; tips of tarsi dusky. First abdominal segment longitudinally rugose, sometimes faintly carinated in the middle. Terebra concealed. Length, 1½; wings, 3½ lines.

According to Haliday, not uncommon in North Ireland during May and June; also found in England by Walker, and twice by me in Leicestershire. It closely resembles the following species, but the difference of the wings renders their separation necessary.

9. *Biosteres sylvaticus*, Hal.

Opius sylvaticus, Hal., Ent. Mag., iv., 219, ♂ ♀.

More slender than the preceding, but otherwise indistinguishable, except by the wings. Stigma fusco-testaceous, emitting the radius before the middle; 3d abscissa curved, concave beneath, approaching nearer to the extremity of the wing than in *Wesmaëlii;* hence the radial areolet is more cultrate and longer in proportion; 2d cubital areolet horizontally longer and vertically narrower. In the ♂, as in the cognate species, the principal nervures are incrassated and darker. Length, 1½; wings, 3½ lines.

According to Haliday, much rarer in North Ireland than the last species; Walker detected the ♂ in England, and I possess both sexes captured near Abergavenny, and Nunton, in Wilts.

10. *Biosteres placidus*, Hal.

Opius placidus, Hal., Ent. Mag., iv., 217, ♀.

Black; base of 2d abdominal segment rufous. Face carinated; oral parts rufo-testaceous; clypeus not touching the mandibles.

Antennæ longer than the body, 38-jointed, black, the scape piceous beneath. Mesothoracic sutures inchoate, effaced posteriorly. A foveola before the scutellum. Mesopleuræ with an impunctate furrow. Metathorax finely rugulose. Wings hyaline; squamula testaceous; nervures fuscous; stigma fusco-testaceous, linear, very long, emitting the radius before $\frac{1}{3}$ of its length. Legs rufo-testaceous; coxæ black at the base; hind tarsi, and apex of their tibiæ, fuscous. Abdomen ovate; 1st segment striated; 2d rufous at the base, its posterior portion, and all the following segments, piceous. Terebra concealed. Male unknown. Length, $1\frac{1}{2}$ line.

Taken only once by Haliday in North Ireland; it seems not to have occurred since. Förster has made of it the genus *Rhabdospilus*.

vii. Diachasma, *Förster.*

Först., Verh. pr. Rheinl., 1862, p. 259.

Characters of *Opius*, except that the 2d cubital areolet, measured horizontally, is shorter, the 2d abscissa of the radius not exceeding in length the 1st intercubital nervure, and the stigma is short, ovate, or subtriangular. The shortness of the stigma alone separates *Diachasma* from *Biosteres*. The radius, according to Förster, should originate *beyond* the middle of the stigma; but the rigour of this restriction excludes two species, and would lead to the formation of two new genera for their reception. To avoid this, I have ventured so far to enlarge the limits of *Diachasma* as to leave the origin of the radius undetermined. Of the four species brought together under this denomination, two, viz., *caffer* and *rugosa*, are not provided for in Förster's synoptical table; it may be presumed that they were unknown to him, or he would have been obliged, on his own principles, to make a separate genus for each.

Table of Species.

(2) 1. First abdominal segment smooth and shining .. .. 1. *caffer*, Wesm.
(1) 2. First abdominal segment rugulose.
(6) 3. Second and third abdominal segments smooth.
(5) 4. Abdomen, after the 1st segment, black .. 2. *cephalotes*, Wesm.

(4) 5. Abdomen, after the 1st segment, in great part rufo-testaceous .. .. .. 3. *fulgida*, Hal.
(3) 6. Second abdominal segment and great part of the third deeply striated .. .. 4. *rugosa*, Wesm.

1. *Diachasma caffer*, Wesm.

Opius caffer, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 150; Hal., Ent. Mag., iv., 217, ♂ ♀.

Black, shining; face strongly carinated; clypeus short, not reaching the mandibles, its lower edge rounded and somewhat raised; mandibles dull rufous in the middle, scarcely wider at the base; palpi short, black. Antennæ ♀ rather shorter than the body, 29-jointed; of the ♂ somewhat longer, 32-jointed; all the joints black, short. Mesothoracic sutures inchoate. A large oval fovea before the scutellum. Mesopleuræ smooth and shining, with hardly a fovea, but a short narrow series of 3 or 4 punctures. Metathorax smooth. Wings slightly infumated; stigma and nervures fuscous; 3d abscissa of the radius subobsolete towards the end (*cf. Ademon decrescens*, *ante*); if complete, it would reach the margin of the wing somewhat before the extremity; stigma oval, emitting the radius from the middle; 2d abscissa much shorter than the 1st intercubital nervure, and much longer than the 2d; recurrent nervure evected. Hind wings with a distinct pobrachial transverse nervure. Legs black; base of hind tibiæ in the ♀ dull rufous; hind femora somewhat incrassated and compressed; sometimes the legs are dull rufous, the femora black above, and the tarsi infuscated. Abdomen oval, entirely free from rugosity; 1st segment short, with two lateral channels, the disk raised, smooth and shining. Terebra exserted to the extent of $\frac{1}{4}$ of the abdomen. Length, $1\frac{1}{3}$; wings, 3 lines.

Both sexes were discovered by Wesmael near Brussels, and found also by Walker in the London district; I have taken the ♂ in Epping Forest.

2. *Diachasma cephalotes*, Wesm.

Opius cephalotes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 149, ♀ (not of Ratzeburg, which is a *Cenocœlius*).

Black; vertical and occipital orbits of the eyes rufous. Head large, broader than the thorax; face carinated, vaguely punctured; clypeus not reaching the mandibles, deplanate, punctate, circumscribed by an impressed semicircular line, its lower edge straight,

obsoletely margined; mandibles rufous; palpi dusky. Antennæ ♂ ♀ hardly longer than the body, stout, setose, tapering outwards, 36—37-jointed, all the joints short; black, base of scape dull rufous. Mesothoracic sutures complete, deeply impressed, crenulate, meeting in an acute angle before the scutellum. Mesopleuræ with a long furrow, deeply crenate. Metathorax rugose. Wings rather short, slightly infumated; radial areolet short, ending just before the extremity of the wing; stigma and nervures blackish; stigma oval, emitting the radius beyond the middle; recurrent nervure interstitial. Hind wings with a distinct pobrachial transverse nervure. Legs stout, rufo-testaceous; upper side of coxæ, 1st joint of trochanters, and tarsi towards the tips, blackish. Abdomen oblong, rather narrow, with subparallel sides; longer in the ♂, and truncate at the extremity; 1st segment rugulose, not much widened posteriorly, indistinctly carinated in the middle, with visible tubercles. Terebra not surpassing the anus. Length, 2; wings, 4 lines.

Wesmael described a mutilated ♀ found near Brussels; the species was not known to Haliday. Both sexes occurred sparingly in a hedge near Nunton, in Wilts, where several were taken by Dr. Capron and myself.

3. *Diachasma fulgida*, Hal. (Pl. II., fig. 9, ♂).

Opius fulgidus, Hal., Ent. Mag., iv., 217, ♀.

♂. Variable; rufous, metathorax, pectus, 1st abdominal segment, and a transverse band on each of the following segments, blackish; wings infuscated; form robust. Head rufous; palpi piceous; clypeus not touching the mandibles. Antennæ longer than the body, 37-jointed, black, scape piceous beneath. Disk of mesothorax rufous, its sutures impunctate, obsolete behind the middle. A shallow fovea before the scutellum. Mesopleuræ rufo-piceous, with a strongly crenate furrow. Scutellum and metathorax black, the latter coarsely rugose. Wings infuscated; nervures and stigma blackish, the latter very large, ovate, lanceolate, emitting the radius beyond the middle; 1st abscissa obliterated by the stigma, punctiform; 2d as long as the 1st intercubital nervure and much longer than the 2d; 3d abscissa straight, nearly reaching the extremity of the wing; recurrent nervure interstitial. Hind wings with a distinct pobrachial transverse nervure. Legs rather stout, rufo-testaceous; last joint of tarsi fuscous. Abdomen ovate-orbiculate; 1st segment oblong, rugulose, blackish; the following segments rufo-testaceous, cinctured with fuscous bands more

or less confluent. Female not known. Length, $1\frac{2}{3}$; wings, $3\frac{3}{4}$ lines.

Var. 1. The colours given above are those of Haliday's specimen, discovered by Walker in the I. of Wight. A ♂ which I took in Epping Forest differs somewhat:—Head black; mesothorax dark piceous, rufescent in the middle; scutellum and metathorax piceo-rufous; this is the specimen copied in the plate.

This species, if I am not mistaken, has been also found at Shiere by Dr. Capron; it is apparently rare everywhere, and has never been observed on the Continent.

4. *Diachasma rugosa*, Wesm.

Opius rugosus, Wesm., Nouv. Mém. Ac. Brux., 1838, p. 147, ♀.

♀. Variable; head rufous; the rest of the body ochreous, more or less obscure, and sometimes quite black above; form robust. Upper part of face carinated; clypeus not quite touching the mandibles, its margin straight; stemmaticum and tips of mandibles black. Antennæ longer than the body, slender, filiform, 33-jointed, black; scape more or less rufous. Mesothoracic sutures deeply impressed, punctulate, effaced posteriorly. No punctiform impression before the scutellum. A coarsely punctured space on the mesopleuræ instead of the usual furrow. Mesothorax coarsely rugose, subcarinate in the middle. Wings hyaline; squamula ochreous; nervures and stigma fuscous; the latter oval, acuminate, emitting the radius a little before the middle; 1st abscissa very short; 2d as long as the 1st intercubital nervure, or even a little longer; 3d straight, almost attaining the extremity of the wing; recurrent nervure evected. Hind wings with no trace of a pobrachial transverse nervure. Legs stout, ochreous; tips of tarsi infuscated. Abdomen short, oval, not longer and hardly wider than the thorax; 1st segment as broad as long, somewhat widened behind, deeply and longitudinally striated, with raised lateral margins and a medial carina; from the base of the 2d segment the abdomen is widened and rounded at the sides to the end of the 3d segment, whence it diminishes rapidly to the anus; 2d segment deeply striated like the 1st; 3d segment more finely striated, its apical margin and the rest of the abdomen smooth and shining. Terebra as long as $\frac{1}{3}$ or $\frac{1}{4}$ of the abdomen. Male unknown. Length $1\frac{1}{2}$; wings nearly 4 lines.

Wesmael's description was made from a specimen apparently female, with the antennæ and terebra broken,

and which he obtained from Liège. The insect was not met with again, to my knowledge, until Mr. Bridgman sent me a specimen from his neighbourhood; and singularly enough, while the above description was in progress, I obtained another by beating a hedge not far from this house, in Cornwall. This last example is more highly coloured, and almost black on the head and thorax.

Explanation of Plate II.

Fig. 1. *Ademon decrescens*, Nees, ♀.
2. *Gnamptodon pumilio*, Nees, ♀.
3. *Hedylus habilis*, Marsh., ♂.
4. Wing of *Eurytenes abnormis*, Wesm.
5. Wing of *Opius nitidulator*, Nees.
6. *Opius testaceus*, Wesm., ♀.
7. *Biosteres carbonarius*, Nees, ♂.
8. *B. hæmorrhoïs*, Hal., ♀.
9. *Diachasma fulgida*, Hal., ♂.

III. *African Micro-Lepidoptera.* By the Right Honble. Lord Walsingham, M.A., F.R.S., F.L.S., &c.

[Read November 5th, 1890.]

Plates III., IV., V., VI. & VII.

I am indebted to many kind correspondents for the material dealt with in this paper. Mr. Gilbert T. Carter, C.M.G., formerly Treasurer and now Administrator of the Gambia Settlements, has sent me many things from Accra and Bathurst, some of which have been dealt with in a previous paper (Trans. Ent. Soc. Lond., 1881, 219—288, Pl. X.—XIII.). Mr. J. M. Hutchinson has collected for me at Kimbolton (Estcourt), Natal. I have also received contributions from Mr. Herbert Druce, Colonel Bowker, Mr. C. G. Barrett, and Mr. F. J. Jackson; the last collection as coming chiefly from the country between Kilima Njaro and the coast is especially interesting. The species described in this paper by no means exhaust the material, and I hope at some future time to work out the remainder. In the meanwhile the present considerable addition to the list of African *Tineidæ* and *Tortricidæ* may perhaps be useful to those who study the subject. The majority appear to belong to well-known European genera, several of which are now recorded for the first time as occurring in Africa.

In my previous paper attention was drawn to certain genera which appear on both sides of the Atlantic; no less than seven additions are here made to this list:—*Phœcasiophora*, Grote, *Œta*, Grote, *Ide*, Chambers, *Polyhymno*, Chambers, *Strobisia*, Clemens, *Anorthosia*, Clemens, and *Zarathra*, Walker. Some of these have a still wider distribution, and will soon be also recorded as Asiatic. The genus *Philobota*, Meyrick, hitherto confined to the Australian region, is here recognised. It is extremely probable that a more intimate acquaintance than I possess with the numerous new Australian genera characterised by Meyrick would show

that other African forms not dealt with in this paper can be rightly referred to some of them. The Indian genus *Timyra*, Walker, is now found to occur in Africa.

Some few corrections are made in the synonymy of described genera: *Nigilgia*, Walker, is identified as equal to *Phycodes*, Guenée; *Polyhymno*, Chambers, turns out to be the same as the South American genus *Copocercia*, subsequently described by Zeller; my African genus *Teratopsis* is Heinemann's *Cacochroa*, with which I have only lately become acquainted in Europe.

Nine new genera are characterised in this paper, seventy-one new species are described and figured, while additional localities are given for many previously known; moreover, some few omissions in my former list of South African species are corrected.

TORTRICIDÆ.

TORTRICINÆ.

Teras, *Tr.*

Teras (*Acleris*, Hb.) *algoana*, F. & R., Reise Nov. Lp., Pl. CXXXVII., 50. (1875), ♀.

Grahamstown (Cape Colony).

This species, with which I am unacquainted, was accidentally omitted from my former paper (Trans. Ent. Soc. Lond., 1881), which professed to give a complete catalogue of South African *Tortricidæ*.

Cacœcia, *Hb.*

Cacœcia adustana, Wlsm.

Grahamstown (Cape Colony); one specimen (*Druce*).

I am only acquainted with the ♀ of this species; the reception of the ♂ may perhaps prove that it should be referred to *Pandemis*.

[Pl. iii., fig. 1.]

Cacœcia occidentalis, sp. n.

Antennæ reddish brown. *Palpi* reddish brown. *Head* deep reddish brown. *Fore wings*, ♂, reddish brown, paler beyond the oblique median fascia, much shaded with purplish fuscous scaling from the base of the dorsal margin nearly to the anal angle; this

fuscous scaling extends upwards as far as the middle of the wing, where a rich chestnut-brown fascia, running obliquely outwards from the middle of the costal margin, meets it and blends with it; a small space on the middle of the dorsal margin is slightly paler than the surrounding surface; towards the apex an obliquely curved shade of rich chestnut-brown is attenuated from the costal margin to the lower half of the apical margin; cilia reddish brown. In the ♀, which is considerably larger than the ♂, the purplish fuscous scaling on the dorsal half of the wing is reduced to two dorsal spots, the first before, the other beyond the middle; these are mixed with chocolate-brown, but the whole wing-surface shows a mottled appearance caused by patches and lines of pale steel-grey scales, visible only in a strong light. *Hind wings* rich brownish ochreous, with a cupreous tinge; cilia paler, with a darker line near their base. *Abdomen and anal tuft* the same colour as the hind wings. *Exp. al.* ♂ 16 mm., ♀ 24 mm.

Hab. Bathurst (Gambia); six specimens. "Taken at light, November and December" (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

Loxotænia, *Stph.*

The genus *Loxotænia* is retained in the present paper, for, although I am inclined to agree with Mr. Meyrick in suppressing it in favour of *Cacœcia* upon the grounds stated in his paper on the classification of the *Tortricina* of Australia (Proc. Linn. Soc. N. S. W., vi., 483 (1882)), it involves a more considerable alteration of accepted nomenclature than would be justified without a detailed examination of a considerable number of North American, as well as African, species, which I am not at present in a position to undertake.

Loxotænia capensana, Wkr.

Estcourt (Natal), two specimens (*Hutchinson*); Grahamstown (Cape Colony), one specimen (*Druce*).

Loxotænia elegans, Wlsm.

Estcourt (Natal), five specimens (*Hutchinson*); Grahamstown (Cape Colony), two specimens (*Druce*); Zululand, one specimen (*collected by the late Col. Harvey Tower*).

Pandemis, *Hb.*

Pandemis reciprocana, Wkr.

Teras reciprocana, Wkr., Cat. Lp. Ins. B. M., XXVIII., 295. (1863).

Cacœcia reciprocana, Wlsm., Trans. Ent. Soc. Lond., 1881, 221.

When writing my previous paper I was only acquainted with the ♀ of this species, and was consequently unable to refer it with certainty to *Cacœcia;* I have since received two males, collected at Estcourt (Natal) by Mr. J. M. Hutchinson. These differ from *Cacœcia*, Hb., in not possessing a costal fold, and *reciprocana* should be placed in the genus *Pandemis*, Hb., although the notch in the basal joint of the antennæ of the ♂ is but slightly indicated.

Pandemis dorsiplagana, Wlsm.

Loxotœnia dorsiplagana, Wlsm., Trans. Ent. Soc. Lond., 1881, 222—3.

This species should also be referred to *Pandemis*, Hb.

Grahamstown (Cape Colony), one specimen (*Druce*); Estcourt (Natal), one specimen (*Hutchinson*).

Pandemis capitana, F. & R.

Tortrix capitana, F. & R., Reise Nov. Lp., Pl. CXXXIX., 48—49 (1875).

Cacœcia ? capitana, Wlsm., Trans. Ent. Soc. Lond., 1881, 221—2.

I was unacquainted with this species in 1881, and referred it provisionally to *Cacœcia*. I have since received both sexes, which prove it to be a *Pandemis*.

Grahamstown (Cape Colony), four specimens (*Druce*).

Argyrotoxa, *Stph.*

[Pl. iii., fig. 2.]

Argyrotoxa tigrina, sp. n.

Antennæ brown at the base, greenish beyond. *Palpi* projected second joint thickly clothed, the scales at its apex projecting slightly beneath the short apical joint; whitish ochreous above,

umber-brown at the sides and beneath. *Thorax* ochreous above, brown at the sides, the tegulæ shining grey. *Fore wings* with the costa very slightly raised in the middle, apex pointed, apical margin oblique, not convex: silvery grey, with four narrow transverse fasciæ, each golden yellow, with an umber-brown central line throughout; the first commencing at one-third from the base, slender, outwardly convex; the second central, stouter, slightly convex outwardly, and differing from the others in the more important umber-brown line nearly covering its outer half; the third at about two-thirds of the wing-length, slightly oblique, tending outwards from costal to dorsal margin, where it terminates just before the anal angle; the fourth, also oblique, terminating beyond the anal angle; beyond these fasciæ is a short transverse streak of a similar colouring, immediately before the apex, preceded by a short costal streak of the same colour; a diffused golden yellow basal-streak above the middle does not reach the first fascia; cilia greyish fuscous. Under side greyish, with small pale ochreous and brown costal spots beyond the middle. *Hind wings* and cilia grey. Under side whitish grey. *Abdomen* darker grey; anal tuft ochreous. *Legs* whitish ochreous. *Exp. al.* 16 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

[Pl. iii., fig. 3.]

Argyrotoxa flavicostana, sp. n.

Antennæ, head, and face pale straw-colour. *Palpi* greyish fuscous. *Thorax* greyish fuscous, narrowly margined anteriorly with pale straw-colour; tegulæ pale straw-colour. *Fore wings* greyish fuscous, the costal margin pale straw-colour to beyond the apical third; the lower edge of the clearly-defined pale costal band is somewhat sinuous and narrowly margined with whitish; at one-third from the apex a pale straw-coloured transverse streak, or narrow fascia, reaches to the dorsal margin immediately before the anal angle, where it is somewhat dilated, this fascia is much attenuated (almost interrupted) below the costal band, with which it becomes blended, it is narrowly margined on both sides by a whitish line; a pale whitish narrow sinuous line runs from the anal angle around the apical margin; there are a few (4 or 5) small greyish fuscous costal spots in the pale costal band, and a series of spots (about 7) of the same colour runs down the centre of the transverse fascia; cilia pale ochreous, with one or two darker lines. *Hind wings* rather pointed, with the outer margin

very oblique, greyish brown; cilia the same. *Abdomen and legs* greyish brown. *Exp. al.* 13 mm.

Hab. Bathurst (Gambia), three specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

[Pl. iii., fig. 4.]

Argyrotoxa viridis, sp. n.

Antennæ rather more than half the length of the fore wings, brownish fuscous, slightly pubescent. *Palpi* brownish ochreous, dusted externally with fuscous; second joint thickened anteriorly, somewhat coarsely scaled; apical joint obtuse, much shorter than the second. *Head* dull brown, with erect scales above. *Thorax* bright green, with a vermilion-red oblique streak on each side posteriorly. *Fore wings* about twice as long as wide, costa suddenly arched near the base, thence parallel with the dorsal margin to the slightly rounded apex; apical margin straight, somewhat rounded off at the anal angle: bright bluish green, the costal and apical margins narrowly brownish ochreous, on which are a series of about fourteen black dots and spots of different sizes from the base to the apex, some of which are margined on their lower edges with red; along the apical margin are also some black spots, but somewhat suffused and ill-defined; upon the surface of the wing are about seven conspicuous vermilion-red spots or streaks; the first elongate, reniform, extending obliquely downwards, near the base of the wing, to the fold; a second also on the basal third of the wing, elongate, quadrangular, obliquely placed above, beyond, and parallel to the first; below this one is an elongate streak of the same colour, the upper end of which barely crosses the fold, the lower end reaching obliquely the basal third of the dorsal margin; about the middle of the wing is another less elongate quadrangular spot, above which is a streak connected with a black costal spot, and beneath a rather larger oblique streak crossing the fold to the dorsal margin beyond the middle; an elongate oblique streak of the same colour, its upper end somewhat dilated, extends from the upper end of the cell towards the anal angle, but does not reach it; beyond the cell the wing is tinged with dull greyish or purplish fuscous; an undulating narrow whitish line forming the inner edge of the ochreous marginal shade; the middle of the cilia on the apex and apical margin is clouded with greyish or purplish fuscous. *Hind wings* as wide as the fore wings; brown, the costal margin straw-white nearly to the apex, which is produced, the

wing being emarginate beneath; cilia brown. *Abdomen* brown. *Legs* ochreous, clouded with fuscous. *Exp. al.* 14 mm.

Hab. Accra (Gold Coast), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

CONCHYLINÆ.

CONCHYLIS, *Tr.*

Conchylis trimeni, F. & R.

Malvern (Natal), one specimen (*Bowker*).

[Pl. iii., fig. 5.]

Conchylis tricolor, sp. n.

Antennæ simple; orange at the base, leaden beyond. *Palpi* pale orange. *Head* leaden grey above; face orange. *Thorax* transversely barred with orange in front, leaden grey in the middle, and bright scarlet behind. *Fore wings*, costal and apical portions orange, the extreme costal margin dotted irregularly throughout with leaden grey; a large reniform leaden grey spot before the apex, not reaching the costa, but attenuated downwards to the apical margin above the anal angle; a large leaden grey patch extends from the base nearly to the anal angle, occupying three-fourths of the width of the wing, and approaching the costa at its upper and outer angle at two-thirds from the base, its upper and outer edges irregularly sinuous and clearly defined, the outer edge somewhat transverse, oblique; this leaden patch contains three transverse bright vermilion bars, not reaching to its upper edge, and a spot of the same colour; the first bar near the base touching the dorsal margin is angulated outwards on the fold, the second bar tending a little obliquely inwards from the middle of the dorsal margin is attenuated (almost interrupted) at a point a little above the fold; the third bar starting erect from the dorsal margin is dilated and bent a little inwards at half its length; between the first and second bars, and almost touching the orange costal border, lies a nearly circular spot containing a few black scales before its upper edge, which is narrowly margined with orange; cilia orange. *Neuration* 7 and 8 from a common stem. *Hind wings* with the costal margin depressed before, and the outer margin concave below, the produced but obtusely pointed apex; brownish fuscous; cilia the same, with a slight purplish gloss. *Neuration* 3 and 4 from a common stem, as also 6 and 7. *Abdomen* brownish fuscous. *Exp. al.* 10 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂, Mus. Wlsm.

GRAPHOLITHINÆ.

EUDEMIS, *Hb.*

Eudemis botrana, Schiff.

Pietermaritzburg (Natal), October—November, one specimen (*Bowker*).

This species has not apparently been hitherto recorded from South Africa; it has probably been introduced with its well-known food-plant, the grape-vine.

[Pl. iii., fig. 6.]

Eudemis spissana, Z.

Grapholitha spissana, Z., Hand. Kong. Svensk. Vet.-Ak., 1852, 82—3.

This species has much the appearance of a true *Grapholitha*, but agrees in neuration with *Eudemis*, Hb., to which genus it should be transferred. There is only one point in which Zeller's description seems to require an additional note; he describes the four costal streaks before the apex as white; these are of a leaden grey if looked at in an ordinary light, but, being somewhat metallic, they appear almost white if held in certain positions. The type being in Stockholm, I have figured the species, which, I have no doubt, is rightly identified. Zeller was only acquainted with the ♀; I have both sexes.

Estcourt (Natal), four specimens (*Hutchinson*).

BACTRA, *Steph.*

Bactra lanceolana, Hb.

Estcourt (Natal), four specimens (*Hutchinson*).

ECCOPSIS, *Z.*

Eccopsis wahlbergiana, Z.

Bathurst (Gambia), ten specimens (*Carter*).

[Pl. iii., fig. 7).

Eccopsis ? nebulana, sp. n.

Antennæ cinereous, a dark spot beneath on each basal joint. *Palpi* pale cinereous; second joint with a blackish spot on the upper edge towards the base, beyond this an oblique transverse bar, followed by some darker shading. *Head* fuscous above; face cinereous, with a conspicuous black spot in front near each eye *Thorax* fuscous, the tegulæ cinereous at the base. *Fore wings* cinereous, mottled with delicately striated patches of leaden grey; with a series of short triangular oblique spots throughout the length of the costal margin separated by pale geminations, the one at half the wing-length being the most important, expanded outwards below the costa, and margined with a pale cinereous line; on the middle of the dorsal margin is a large, very distinct, dark brownish-fuscous patch, rounded at its upper edge above the middle of the wing, and with a slight pointed excrescence at its upper and outer corner, margined throughout by a slender cinereous line; the extreme apex of the wing is brownish fuscous, and below it, arising from about the middle of the apical margin, is a pale brownish or greyish fuscous well-defined and inwardly oblique dash running upwards, but not reaching to the costal geminations; a dark line runs along the apical margin before the greyish cinereous cilia. *Hind wings* greyish fuscous, with a dark line near the base of their paler cilia. *Abdomen* greyish fuscous. *Exp. al.* 18 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

I have little doubt that this is a true *Eccopsis*, although no male specimen has reached me. The species is very distinct.

Penthina, *Tr.*

[Pl. iii., fig. 8.]

Penthina brevibasana, sp. n.

Antennæ dark greyish fuscous, with the basal joint whitish ochreous. *Palpi* whitish ochreous. *Head* reddish brown above, whitish ochreous in front. *Thorax* dark brown, tegulæ reddish brown. *Fore wings* rather pointed, the apical margin slightly oblique, the costa convex; whitish ochreous, much mottled with olive-grey and chestnut-brown, with a conspicuous short basal patch reddish brown, darkened on its outer half by a strong admixture of deep fuscous scales, its outer edge, leaving the costal

margin at about one-fourth of the wing-length, reaches to beyond one-third of the dorsal margin, and is slightly serrated throughout; this is followed by a large irregularly diffused olivaceous patch, above which, on the costa, are two more olivaceous spots, with indistinct short oblique costal streaklets between, before, and beyond them; beyond the olivaceous patch are streaks and mottlings of chestnut-brown, not reaching to the costal quarter of the wing; cilia shining dark purplish fuscous, almost black. Under side greyish fuscous, with a pale ochreous space along the costal and apical margins, which is irrorated throughout and shaded at the extreme costa near the base with greyish fuscous. *Hind wings* brownish grey, with slightly paler cilia, along the base of which runs a slender line of the wing-colour. *Abdomen* dark brownish grey. *Legs* whitish ochreous. *Exp. al.* 22 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♀, Mus. Wlsm.

A conspicuous and distinct species, easily recognised by the short outwardly oblique dark basal-patch, contrasting somewhat strongly with the paler surface of the wing beyond it.

Sericoris, *Tr.*

[Pl. iii., fig. 9.]

Sericoris apicipunctana, sp. n.

Antennæ grey. *Palpi* tawny grey, pale beneath and at the extreme apex. *Head* tawny grey, the face paler. *Thorax* tawny grey. *Fore wings* brownish fuscous, with an equal admixture of diffused leaden grey mottlings, the darker shade prevailing only in an ill-defined oblique transverse band beyond the middle; the pale costal geminations are alternated with brownish fuscous spots or streaks, of which two spots at the apex are most conspicuous, the first costal, triangular, and outwardly oblique, the other apical, larger, more rounded, and somewhat inverted; some tawny-brown colouring is visible about the ends of the costal geminations; cilia tawny, paler at the anal angle, a dark line near their base. *Hind wings* brownish fuscous, with paler cilia, along the base of which runs a pale line. *Abdomen* brownish fuscous. *Exp. al.* 12—16 mm.

Hab. Bathurst (Gambia), three specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

PHÆCASIOPHORA, *Grote.*

[Pl. iii., fig. 10.]

Phæcasiophora variabilis, sp. n.

Antennæ simple; greyish fuscous. *Palpi* short and compact the apical joint small, greyish fuscous above, paler beneath. *Head* greyish fuscous, clothed with short rough scales. *Thorax* the same colour as the head. *Fore wings* greyish fuscous, paler along the first half of the dorsal margin, and sometimes with a pale diffused patch on the costal margin before the middle, in which are two or three small dark costal spots; beyond this is a short brownish fuscous oblique costal streak, followed by others of the same colour close to the apex; the most noticeable marking on the wing is a large dark brown patch above the anal angle, paler about the angle itself, but reaching nearly half-way along the dorsal margin, and approaching the costa before the apex at its upper end, where it is deflexed to a point above the middle of the apical margin; this patch is edged with a slender ill-defined greyish white line throughout its inner and upper margin, which meets a short slender greyish white streak coming from the costa immediately before the apex; in the darker portion of the wing is a somewhat distinctly darker shade along the first half of the fold; cilia greyish white at and below the apex and above the anal angle, but dark brown along the middle of the apical margin. Under side unicolorous pale brownish fuscous, the cilia dirty whitish about the apex and anal angle. *Hind wings* brownish fuscous; cilia greyish white, with an obscure dark line along their base. *Abdomen* brownish fuscous. *Exp. al.* 21 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

The species appears to be variable; the general pattern of coloration is probably maintained, but the colours vary from dark greyish fuscous to reddish brown, or chestnut-brown, and perhaps even to other tints in an extended series.

The African form of this genus differs from the North American type, as described by Grote, in having strong tufts of scales on the hind legs in both sexes (not in the male only). It is interesting to find that not only does the allied genus *Eccopsis* of Zeller (equal Clemens' North American *Exartema*), but that this North American genus, described by Grote (Bull. Buff. Soc. N. H., I., 90,

Pl. II., 4—6 (1873)), also occurs on the African continent.

[Pl. iii., fig. 11.]

Phæcasiophora basicornis, sp. n.

Antennæ greyish cinereous, faintly annulated; the basal joint distinctly white above. *Palpi* greyish fuscous; the second joint stout and thickly clothed. *Head and face* dark brownish fuscous, a few dirty whitish scales on the crest. *Thorax* mottled cinereous and fuscous, its anterior edge darker; posterior edge and tegulæ with some brownish scales. *Fore wings* sprinkled and mottled with cinereous, reddish brown, and fuscous, the base reddish brown on the costal half, streaked with very dark fuscous along the costal margin; the reddish brown scaling is continued towards the dorsal margin in scattered patches, forming a sort of ill-defined basal-patch; beyond this is a pale cinereous ill-defined transverse fascia, rather bowed outwards, and much sprinkled with dusky scaling, a patch of grey occupying its central part above the fold; beyond this fascia is a broad transverse shade of chocolate-brown, tinged with grey on its lower half, narrow at the costal, wide at the dorsal margin, slightly oblique and angulated at the middle of its outer edge; beyond the upper half of this chocolate-brown shade is a conspicuous whitish grey subcostal patch, into which a series of four geminated whitish grey streaks run from the costal margin; a chocolate-brown patch encroaches upon the lower edge of the pale subcostal patch, which runs to a subfalcate attenuated point below the apex, where a slender whitish line interrupts the cilia on the apical margin; the chocolate-brown is modified with grey above the anal angle; cilia brown on the upper half, greyish at the lower half of the apical margin. *Hind wings* brownish fuscous, with a dark line throughout the greyish cilia. *Abdomen* brownish fuscous. *Legs* greyish fuscous, the tufts of the posterior tibiæ distinctly whitish at the ends and on their inner sides. *Exp. al.* 23 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

I have but one specimen; the species is probably variable, but I think it is quite distinct from the one previously described.

Phoxopteris, *Tr.*

Phoxopteris natalana, Wlsm.

Estcourt (Natal), one specimen (*Hutchinson*).

[Pl. iii., fig. 12).

Phoxopteris oculifera, sp. n.

Antennæ umber. *Palpi* dark umber. *Head* pale umber above, frontal tuft dark umber. *Thorax* pale umber, tegulæ darker. *Fore wings* umber, faintly streaked longitudinally with obscure whitish ochreous lines; the costal margin with short pale whitish ochreous geminations throughout; on the dorsal portion of the wing below the fold, and about and above the anal angle, the pale whitish ochreous streaking more largely prevails; on the extreme falcate apex, above the marginal indentation, is an ovate dark umber spot, enclosed above and below, but not at its ends, by short pale whitish ochreous streaks, giving it an eye-like appearance; cilia pale whitish ochreous, tipped with umber at the apex and on the middle of the apical margin. *Hind wings* greyish umber, with paler cilia, and a dark line along their base. *Abdomen* greyish umber. *Exp. al.* 14 mm.

Hab. Bathurst (Gambia), November, "on species of mallow," one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

[Pl. iii., fig. 13.]

Phoxopteris falcata, sp. n.

Antennæ pale fawn. *Palpi* whitish fawn, rather long, and roughly clothed with long diffuse scales above and beneath the second joint. *Head* whitish fawn. *Thorax* pale fawn. *Fore wings* narrow, elongate, falcate; veins 7 and 8 from a common stem (in which it differs from the typical form of this genus): fawn-colour along the costal third to beyond the middle, deeply shaded with brown on the dorsal and apical portions; the pale costal third is interrupted by a triangular ill-defined brown shade, commencing at the middle of the costal margin; from near the end of the fold a dark brown dash points obliquely upwards towards the apex; the extreme apex shaded with brown, and a dark line along the base of the pale marginal cilia. *Hind wings* brownish fuscous, with a pale line along the base of the cilia. *Abdomen* greyish fuscous. *Exp. al.* 11—12 mm.

Hab. Bathurst (Gambia), "November, taken at light and flying among mallow," two specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

This species is apparently somewhat variable in the extent and definition of the brown shading.

Coptoloma, *Ld.*

[Pl. iii., fig. 14.]

Coptoloma dimidiata, sp. n.

Antennæ pale ochreous. *Palpi* orange ochreous. *Head* ochreous. *Thorax* shining orange ochreous. *Fore wings* shining orange ochreous to one-half their length, sparsely irrorated with purplish fuscous scales; beyond the middle bright orange ochreous, irregularly suffused with purplish fuscous streaks and patches, with three or four very oblique metallic steel-blue costal streaklets; cilia orange ochreous, with a silvery metallic lustre, especially on the lower half of the apical margin, within which three or four small black dots indicate an ocelloid patch; the purplish patches are prolonged further towards the base on the dorsal than on the costal margin. Under side pale greyish fuscous. *Hind wings* fuscous, with paler cilia. Under side pale greyish fuscous. *Abdomen* greyish fuscous. *Legs* whitish ochreous, spotted above on the ultimate tarsal joints. *Exp. al.* 8 mm.

Hab. Bathurst (Gambia), "taken at light early in December," two specimens (*Carter*).

Type, ♂, Mus. Wlsm.

This species differs from its Asiatic ally, known as *Hemerosia aurantiana*, Pryer (Cist. Ent. II., 235, Pl. IV., 12. (1877)), in the more equal division of the pale and dark portions of the fore wing; in *aurantiana* the former predominates.

Dichrorampha, *Gn.*

[Pl. iii., fig. 15.]

Dichrorampha excisa, sp. n.

Antennæ pale brownish fuscous. *Palpi* whitish cinereous. *Head* brownish fuscous; face whitish cinereous. *Thorax* pale brownish fuscous. *Fore wings* somewhat excised below the apex, and bulged above the apical margin: pale brownish fuscous to a little beyond the middle; the remainder of the wing suffused with a delicate mauve or pale lilac tint, obscurely striated with darker shades; the inner edge of this suffused portion of the wing is clearly defined, slightly convex towards the base on the lower two-thirds of the wing-width, and abruptly biangulated beneath the costa; on the costal margin are three or four pairs of pale oblique streaklets, those nearest to the apex being shining silvery; two black dots, one opposite the middle, the other below the middle, of the apical margin, the upper one followed by a silvery spot at the bulge, are

the only indications of an ocelloid spot; cilia shining silvery, with a dark line along their base. *Hind wings* brownish fuscous, with pale cilia, also with a dark line near their base. *Abdomen and legs* greyish fuscous. *Exp. al.* 16 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂, Mus. Wlsm.

CHOREUTIDÆ.

Choreutis, *Hb.*

Choreutis bjerkandrella, Thnb.

Estcourt (Natal), two specimens (*Hutchinson*).

Simæthis, *Leach.*

[Pl. iii., fig. 16.]

Simæthis flavimaculata, sp. n.

Antennæ ciliated in the ♂; brownish fuscous, spotted above with whitish ochreous. *Palpi* pale yellowish, the second joint barred externally with brown, the apical joint with two brown rings, one at the base, the other before the apex. *Head* pale yellowish in front, brown above posteriorly. *Thorax* brown above, the anterior margin broadly pale yellow, with an orange tinge; yellowish beneath. *Fore wings* chocolate-brown, with three conspicuous yellow patches, all slightly tinged with orange; the first at the outer edge of the basal third occupies more than two-thirds the breadth of the wing, beginning narrowly on the costal margin, considerably dilated to the fold, but not reaching the dorsal margin; the other two patches are in the apical third of the wing, one almost touching the costal margin, and with a slender yellow curved costal streak immediately preceding it, the other, which is larger, situated just above the anal angle, rounded in form like the smaller one above it, and also not actually reaching the margins of the wing; cilia brownish at the base, paler outwardly. Under side brownish, with a faint whitish ochreous spot beyond the middle of the costal margin. *Hind wings* brown, with a small indistinct irregular yellowish patch radiating from their base to the middle; cilia cinereous, with a brown line along their base. Under side brownish. *Abdomen* dark brown, a few paler scales at the base laterally. *Legs* brown; posterior tibiæ, tarsi, and spurs conspicuously banded and spotted with yellow. *Exp. al.* 14 mm.

Hab. Zanzibar, one specimen (*Jackson*).

Type, ♂, Mus. Wlsm.

ATYCHIADÆ.

ATYCHIA, *Latr.*

Atychia quiris, F. & R.

Cape Colony, two specimens (*G. F. Mathew*).

[Pl. iii., fig. 17.]

Atychia albiciliata, sp. n.

Antennæ brownish fuscous. *Palpi* brownish above, except at the base; the base and under side white, except on the apical joint, which is brownish above and below. *Head* brownish fuscous. *Thorax* blackish (perhaps slightly darkened by greasiness). Under side fuscous, with some shining scales. *Fore wings* narrow; brownish fuscous, sprinkled with greyish scales, especially on the outer half; a faint pale line about the base of the cilia, which are brownish fuscous, slenderly tipped with white. Under side brownish fuscous, with a subapical patch and central streak white. *Hind wings* wider than the fore wings; clear pure white, with brownish fuscous base, and with a broad brownish fuscous band of nearly half their width running around the hind margin and apex, widest about the base and middle; cilia pure white, except at the apex, where they are touched with brownish. Under side with markings similar to those on the upper surface. *Abdomen* black, each segment with a very narrow white ring posteriorly, the three ultimate annulations more conspicuous than the others. Under side fuscous, with some shining scales. *Exp. al.* 15 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

A small species allied to *A. quiris*, F. & R., but more distinctly marked.

PHYCODES, *Gn.*

[Pl. iii., fig. 18.]

Phycodes punctata, sp. n.

Antennæ greyish fuscous, paler beneath, with the basal joint whitish on the under side. *Palpi* white, the apical joint very short, not projecting beyond the head, tinged with grey above. *Head* leaden grey above, white beneath; face shining metallic dark fuscous. *Thorax* leaden grey, with a shining submetallic gloss. *Fore wings* shining leaden grey, with black spots, the scales so arranged as to give the appearance of minute transverse striæ under the lens; on the extreme costal margin are five very small spots

rom the base, followed by one slightly larger, one beyond the middle, which is again followed by two small and one larger, beyond which are one or two small ones before the apex; the other spots are six distinct ones and one small one, arranged as follows: one above and one below the fold, before the middle of which the lower one is considerably nearer to the base than the upper one; a transverse line of three beyond the middle parallel with the slightly oblique apical margin; beyond these one distinct spot below the middle of the apical margin, but not touching it, and above this one small one rather indistinct; cilia shining leaden grey with a bronzy tinge. Under side pale brownish fuscous. *Hind wings* brownish fuscous, showing two pale spaces radiating from the base to about half the width of the wing; cilia white, tinged with fuscous at the apical and abdominal angles. Under side pale brownish fuscous. *Abdomen* greyish fuscous above, beneath bright glossy shining white. *Legs* greyish fuscous, faintly pale spotted above, beneath bright glossy shining white. *Exp. al.* 20 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

[Pl. iv., fig. 19.]

Phycodes substriata, sp. n.

Antennæ fuscous. *Palpi* fuscous. *Haustellum* brown, long, and naked. *Head* greyish fuscous; face shining bronzy. *Thorax* cinereous, speckled with fuscous above, pure white beneath. *Fore wings* cinereous, densely striated with slender transverse brownish fuscous lines, and with one fascia and several costal and discal spots also brownish fuscous; the fascia is narrow and straight from costal to dorsal margin at about one-third from the base; it is preceded by two small costal spots, and followed by three or four others, also costal, with faint indications of other diffused costal spots towards the apex; at about two-thirds from the base is a single spot just beyond the end of the cell, with three smaller ones above, below, and before it; the apical margin is strongly tinged with shining bronzy brown; cilia shining bronzy. *Hind wings* brown, with whitish cilia, except at the extreme apex. *Abdomen and legs* greyish fuscous above, white beneath. *Exp. al.* 17—18 mm.

Hab. Zanzibar, three specimens (*Jackson*).

Type, ♂, Mus. Wlsm.

This species is closely allied to *Phycodes minor*, Wlsm., an Indian form.

[Pl. iv., fig. 20.]

Phycodes albitogata, sp. n.

(*Antennæ and palpi* broken). *Head* whitish grey, speckled. *Thorax* whitish grey, speckled with bronzy fuscous above, white beneath. *Fore wings* whitish grey, with delicate transverse bronzy fuscous striæ throughout, and with two distinct straight transverse fasciæ; the first one at one-third from the base, bronzy black, containing two shining metallic brassy yellow bars, reaching throughout from costal to dorsal margin; the second at two-thirds from the base, narrower than the first, slightly interrupted above the fold, and containing one shining metallic brassy yellow bar; the apical portion of the wing beyond the second fascia is slightly shaded as well as striated with bronzy fuscous, and groups of shining metallic brassy yellow scales lie along the apical margin from the apex nearly to the anal angle; there is a small bronzy fuscous streak on the extreme costal margin at the base; cilia shining bronzy brown. Under side unicolorous brown. *Hind wings* shining semi-transparent white, with a strong lilac hue, and having a broad brown band along the costal margin; cilia delicate white, with a more opaque white line along their base, merging into brown at the extreme apex. Under side lilac-white, with a broad brown band along the costal margin, widening from the base outwards. *Abdomen* shining greyish white above, white beneath. *Legs* white. *Exp. al.* 16 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

This species differs from *Nigilgia adjectella*, Wkr., in the second fascia having but one metallic line or bar instead of two, in the absence of a metallic line from this fascia to the apex, and in its paler colour and white hind wings.

Phycodes adjectella, Wkr.

Nigilgia adjectella, Wkr, Cat. Lp. Ins. B. M., XXVIII., 512. (1863).

I am unable to separate *Nigilgia* from *Phycodes*, Gn., a genus which has hitherto been confined to the Indian region, but which is apparently equally well represented in Africa. Walker's type was received from Sierra Leone. I have in my collection a specimen, also a female, received from Mr. F. J. Jackson, who met with it at Tangani, Kolumbi Creek (East Africa), in August, 1885.

TINEIDÆ.

TALÆPORIANÆ.

DISSOCTENA, *Stgr.*

[Pl. iv., fig. 21.]

Dissoctena affinis, sp. n.

Antennæ bipectinate, each of the long pectinations slender and pubescent. *Palpi* very short, subochreous. *Head* brownish cinereous. *Thorax* cinereous. *Fore wings* with rather straight costa, rounded apex, and oblique (scarcely convex) apical margin: brownish cinereous, with two indistinct paler subochreous costal patches beyond the middle, and before the middle a very indistinct oblique fascia-form shade of the same colour, dilated outwards from costal to dorsal margin; about three very indistinct subochreous spots on the lower half of the apical margin before the brownish cinereous cilia. *Hind wings* slightly darker than the fore wings, and with a more fuscous shade owing to the absence of subochreous scaling; cilia unicolorous. *Abdomen and Legs* cinereous fuscous. *Exp. al.* 14 mm.

Hab. Estcourt (Natal), three specimens (*Hutchinson*). Type, ♂, Mus. Wlsm.

The subochreous markings on this plainly coloured species are very indistinct, and probably almost obsolete on some examples, unless taken in fine condition. They seem to constitute a sufficient ground for separating the species from the South European *D. granigerella*, Stgr., to which it is nevertheless closely allied.

It seems desirable to subdivide the *Tineidæ* of Heinemann as follows:—

A. Maxillary palpi obsolete.
   1. Fore wings with veins 7 and 8 arising from a common stem out of vein 9 = SETOMORPHINÆ.
   2. Fore wings with veins 7 and 8 *not* arising from a common stem out of vein 9 = EUPLOCAMINÆ.

B. Maxillary palpi 4—6-jointed = TINEINÆ.

SETOMORPHINÆ.

SETOMORPHA, *Z.*

[Pl. vii., fig. 73.]

The neuration of *Setomorpha rutella*, Z. (the type of the genus), is as follows:—

Fore wings 12 veins; 7 and 8 arising from a common stem out of 9, 7 to apex; 5 and 6 slightly curved, parallel; 3 and 4 from a *very short* common stem; 2 from near angle of cell, curved at origin. *Hind wings* 8 veins; 2 and 3 from a point at angle of cell; 5 and 6 from a common stem, 6 to apex.

Hapsifera, Z., agrees with *Setomorpha* in having 7 and 8 of the fore wings stalked out of vein 9, but differs in the form of the palpi, and in having 5 and 6 of the hind wings, as also 2 and 3, separate.

Ischnopsis, Wlsm., should probably be placed in the neighbourhood of these two genera.

Zeller's type of *Setomorpha rutella* is apparently unique, but I have three or four undescribed African species closely allied to it.

EUPLOCAMINÆ.

AUTOCHTHONUS, gen. n.

(*αὐτόχθονος* = bred of the soil.)

Type. *Autochthonus chalybiellus*, Wlsm.

[Pl. vii., fig. 74.]

Antennæ [♂ ?]: ♀ simple. *Labial palpi* coarsely clothed beneath; second joint more than twice the length of the apical joint, the latter projecting obliquely upwards, cylindrical, more or less acute. *Maxillary palpi*, *Haustellum*, *and Ocelli* obsolete. *Head* rough. *Fore wings* narrow, elongate, tufted above, apex depressed, rounded, costal and dorsal margins evenly receding from it. *Neuration* 12 veins; 7 and 8 from a common stem, forming a short fork, 7 to apex; 9 from the same point as this stem; the other veins separate; two internal veins, one running throughout the length of the cell from between 4 and 5; the other, a shorter vein, cuts off the upper angle of the cell to the base of vein 10. *Hind wings* elongate-lanceolate, apex slightly rounded, the margins evenly receding from it, but the dorsal margin is slightly more convex than the costal. *Neuration* 8 veins; 2 curved from the outer third of cell; 3 and 4 from a point at the lower angle of cell; 5 and 6 from a common stem; one internal vein running throughout the length of the cell.

This genus differs from *Euplocamus*, Latr., in the structure of the antennæ, and in having veins 5 and 6 of the hind wings from a common stem, and 3 and 4 from a point.

[Pl. iv., fig. 22).]

Autochthonus chalybiellus, sp. n.

Antennæ simple; ochreous. *Palpi* pale ochreous, the erect apical joint naked; second joint thickly clothed with projecting scales beneath. *Head* pale ochreous. *Fore wings* mottled rather transversely throughout with about equal proportions of shining steel-grey, rich dark brown, and pale ochreous, the latter prevailing in the numerous tufts of raised scales which are scattered over the wing-surface; these are sometimes shielded with steel-grey on their anterior sides; the most conspicuous of these tufts are, one above the middle of the dorsal margin but below the fold, another above it near the costal margin, and another about the anal angle of the cell; but the whole wing-surface is very roughly scaled (the species calling to mind the paler but very similar *Euplocamus horridella*, Wkr., from which it differs, as subsequently stated); cilia mixed brownish and pale ochreous, paler at the anal angle. *Hind wings* æneous, with a purplish gloss; cilia shining greyish. *Abdomen* brownish grey; anal tuft ochreous. *Exp. al.* 14—16 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♀, Mus. Wlsm.

Scalidomia, gen. n.

(σκαλίς = a hoe, ὦμος = shoulder).

Type. *Tinea horridella*, Wkr.

[Pl. vii., fig. 75.]

Antennæ stout, very slightly serrated towards the apex, two-thirds the length of the fore wings. *Labial palpi*, second joint slightly recurved, clothed with projecting scales beneath; apical joint obliquely erect, cylindrical, obtuse, about one-third the length of the second joint. *Maxillary palpi*, *Haustellum*, *and Ocelli* obsolete. *Head* rough. *Fore wings* elongate, apical margin obliquely convex, apex rounded, width equal to about one-third the length; wing-surface more or less tufted with raised scales. *Neuration* 11 veins; 7 and 8 from a common stem, 7 to apex; the other veins separate; an internal vein runs from the space between 5 and 6 to between 9 and 10. *Hind wings* lanceolate-ovate, apex produced, rounded; dorsal margin convex, costal margin nearly straight, slightly depressed from the middle. *Neuration* 8 veins; 3 and 4 somewhat approximate at base; 6 and 7 parallel; two internal veins, one from base of 4, the other from

base of 6, meet in the middle of the cell, and are apparently continued to the base in a common stem.

This genus differs from *Euplocamus*, Latr., in the structure of the antennæ, and in having but 11 veins in the fore wings.

Scalidomia horridella, Wkr.

Tinea horridella, Wkr., Cat. Lp. Ins. B. M., XXVIII., 474. (1863).

Euplocamus horridellus, Wlsm., Trans. Ent. Soc. Lond., 1881, 237—8.

Malvern (Natal), three specimens (*Bowker*); Estcourt (Natal), one specimen (*Hutchinson*).

Barbaroscardia, gen. n.

(βάρβαρος = foreign, *scardia* (nom. gen.)).

Type. *Barbaroscardia fasciata*, Wlsm.

[Pl. vii., fig. 76.]

Antennæ ♂ strongly ciliated. *Labial palpi* roughly clothed beneath; the short projecting apical joint slender, naked, slightly shorter than the second joint. *Maxillary palpi*, *Haustellum*, *and Ocelli* obsolete. *Head* rough. *Fore wings* ovate, apex evenly rounded, costal and dorsal margins convex. *Neuration* 11 veins; 7 and 8 from a common stem, 7 to apex; rest separate; one internal vein running from the base of 6 to the base of 10. *Hind wings* as broad as the fore wings, ovate, costal margin straighter and less convex than the dorsal, apex rounded. *Neuration* 8 veins; 3 and 4 arising from a point at the lower angle of the cell; 5 distinctly separate from 4, nearly parallel with 6 and 7; one internal vein from between 5 and 6 dividing the cell throughout.

This genus differs from *Euplocamus*, Latr., in the structure of the antennæ, and in having only 11 veins in the fore wings.

[Pl. iv., fig. 23.]

Barbaroscardia fasciata, sp. n.

Antennæ pale brownish, ciliated in the male. *Palpi* whitish ochreous, slightly darker at the sides and at the base of the apical joint, projecting, scarcely upturned. *Head* whitish ochreous, densely clothed above. *Fore wings* whitish ochreous, sprinkled with scattered brown scales; a distinct brown transverse fascia lies at one-third of the wing-length, and is followed on the outer

half of the wing by three cuneiform brown spots, two costal and one dorsal, all pointing downwards, and sufficiently connected to form a V-shaped mark, with its apex approximate to the anal angle; the lower extremities of the two costal spots impinge upon the opposite upper corners of the dorsal spot, which occupies the lower half of the wing; cilia whitish ochreous, with a few small brownish spots at their bases. *Hind wings* grey, with scarcely paler cilia. *Abdomen* grey. *Legs* whitish ochreous. *Exp. al.* 14 mm.

Hab. Delagoa Bay (E. Africa); two specimens (*Druce*).

Type, ♂, Mus. Wlsm.

A distinct form, perhaps allied to *Euplocamus stupens*, Wlgrn.

LASIOCTENA, *Meyr.*

Lasioctena sisyræa, Meyr., Trans. Ent. Soc. Lond., 1887, 279.

Grahamstown (Cape Colony).

COMPSOCTENA, *Z.*

Compsoctena primella, *Z.*

I am fortunate in having received the female of this species. It does not fulfil Zeller's prophecy that it would probably prove to be apterous (Hand. Kong. Svensk. Vet.-Ak., 1852, 87), nor my own suggestion that it would have smaller wings and a larger body than the male (Trans. Ent. Soc. Lond., 1881, 227); on the contrary, the wings are larger (exp. al. ♂ 16—18 mm., ♀ 20 mm.).

The body is long and fringed at the sides posteriorly, the ovipositor is conspicuously produced and abruptly squared at the end, not acute. The antennæ are thickly and coarsely scaled, not with clearly divided pectinations, as in the male; but they are in some degree pectinated, the pectinations compressed together, and lying forward along the stem of the antenna. The palpi are roughly clothed with long scattered hair-scales, less closely appressed than in the male. The coloration is much the same as in the male.

There can now be no doubt that this genus should be placed among the *Tineidæ*, where it should stand in the

neighbourhood of *Euplocamus*, Latr., from which it differs chiefly in the separation of veins 7 and 8 of the fore wings. The genus *Lasioctena*, Meyr., seems to differ from *Compsoctena* in the structure of the palpi, which are recurved, and in having veins 6 and 7 of the hind wings approximate at the base. I think I have an undescribed species belonging to this genus.

Malvern (Natal), two specimens (*Bowker*); Grahamstown (Cape Colony), one specimen (*Druce*).

TINEINÆ.

TINEA, *Z.*

Tinea vastella, Z.

Bedford (Cape Colony), one specimen (*Druce*); Grahamstown (Cape Colony), three specimens (*Druce*); Cape Colony, eight specimens (*Zell. Coll.*); Estcourt (Natal), one specimen (*Hutchinson*); Malvern (Natal), one specimen (*Bowker*); Caffraria, one specimen (*Zell. Coll.*); Delagoa Bay (East Africa), one specimen (*Druce*); Kilima Njaro (East Africa), three specimens (*Jackson*); Sudan, two specimens (*Zell. Coll.*), three specimens (*Frey Coll.*).

Tinea tapetzella, Z.

Grahamstown (Cape Colony), one specimen (*Druce*).

This species has apparently not been previously recorded from South Africa.

Tinea fuscipunctella, Hw.

Estcourt (Natal), (*Hutchinson*).

[Pl. iv., fig. 24.]

Tinea zebra, sp. n.

Antennæ whitish ochreous. *Palpi* whitish ochreous. *Head* yellow. *Thorax* brown, inclining to ochreous posteriorly. *Fore wings* pale shining ochreous, the basal third of the costal margin narrowly brown; a brown longitudinal basal streak, tapering outwards, runs along the fold to the anal angle, where it is connected with a brown shade which is continued along the base of the cilia around the apex; a wedge-shaped shade of scattered brown scales points inward from the apex, and terminates in a brown spot and a slender brown line about the end of the cell; cilia pale shining ochreous. Under

side brownish, with pale cilia. *Hind wings and cilia* shining whitish ochreous. *Abdomen and legs* ochreous. *Exp. al.* 14 mm.

Hab. Grahamstown (Cape Colony), three specimens (*Druce*).

Type, ♂, Mus. Wlsm.

BLABOPHANES, *Z.*

Blabophanes longella, Wkr.

Gambia, one specimen (*Druce*); Zululand, one specimen received from the late Col. Harvey Tower.

Blabophanes monachella, Hb.

Bathurst (Gambia), "November—December," one specimen (*Carter*).

This widely-distributed species is apparently new to the African fauna, but this and *longella* are probably only varieties of one species.

Blabophanes speculella, Z.

Estcourt (Natal), three specimens (*Hutchinson*).

Blabophanes rejectella, Wkr.

Estcourt (Natal), three specimens (*Hutchinson*).

Blabophanes rutilicostella, Stn.

Estcourt (Natal), two specimens (*Hutchinson*).

NEMOPHORA, *Hb.*

Nemophora elongatella, Wlsm.

I notice that this species differs slightly in neuration from the European forms of *Nemophora;* veins 5 and 6 of the hind wings are separate, and the cell is somewhat longer.

Estcourt (Natal), three specimens (*Hutchinson*).

CEROMITIA, *Z.*

N. syn. = *AGISANA*, Mschl. (1883).

This genus is distinguished from *Nemophora* by its shorter maxillary palpi, and by having veins 8 and 9 of the fore wings and 5 and 6 of the hind wings separate: it is undoubtedly allied to *Nemophora*.

Ceromitia wahlbergi, Z.

Estcourt (Natal), two specimens (*Hutchinson*); Malvern (Natal), one specimen (*Bowker*).

Ceromitia turpisella, Wkr.

Nemophora turpisella, Wkr., Cat. Lp. Ins. B. M., XXVIII., 497 (1863).

N. syn. = *Agisana caffrariella*, Mschl., Ver. Z.-b., Ges. Wien., XXXII., 308—9, Pl. XVI., 24 (1883).

This species belongs properly to the genus *Ceromitia*, but the neuration does not appear to be constant; veins 8 and 9 of the fore wings being coincident at the base in some specimens, although not necessarily in both wings; the separation of veins 5 and 6 of hind wings is, however, a constant character.

Annshaw (Cape Colony), one specimen (*Barrett*); Estcourt (Natal), one specimen (*Hutchinson*); Malvern (Natal), one specimen (*Bowker*); Delagoa Bay (East Africa), two specimens (*Druce*).

Ceromitia alternipunctella, Wlsm.

Nemophora alternipunctella, Wlsm., Trans. Ent. Soc. Lond., 1881, 245—6.

This species must also be placed in *Ceromitia*.

Grahamstown (Cape Colony), one specimen (*Druce*).

ADELINÆ.

ADELA, *Latr.*

[Pl. iv., fig. 25.]

Adela cuneella, sp. n.

Antennæ in the ♂ about twice as long as the fore wings; brownish above, hoary beneath, the basal third spotted with whitish on the upper side. *Palpi and Head* very roughly clothed with long hair-like scales, brownish fuscous above, hoary beneath. *Thorax* brownish fuscous above, hoary beneath. *Fore wings* hoary, thickly clothed with closely-packed elongate bronzy-brown scales, in some lights showing metallic lustre; at two-thirds of the wing-length is an outwardly oblique, cuneiform, whitish costal streak reaching half-across the wing, margined with bronzy brown on each side, the inner margin slightly darker than the outer; at the apex of the wing is a rather distinct small curved fuscous line at the base of the cilia, which beyond it are white, tipped with bronzy

brown; this curved line is preceded in the costal cilia by a short inwardly oblique whitish streak, margined by bronzy-brown scales, and below it, in the cilia of the apical margin, are a few corresponding whitish scales, below which is a slender broken bronzy line at the base of the cilia, which are dirty white, shading to bronzy brown at the anal angle. *Hind wings* bronzy brown, with a darker line along the base of the unicolorous cilia. *Abdomen and Legs* fuscous; tarsal joints spotted with white. *Exp. al.* 10—11 mm.

Hab. Estcourt (Natal), two specimens (*Hutchinson*).

Type, ♂, Mus. Wlsm.

A small, rather obscure species, but very distinct from any of its known European or American allies.

NEMOTOIS, *Hb.*

[Pl. iv., fig. 26.]

Nemotois humilis, sp. n.

Antennæ bronzy, faintly annulated, rather more than twice as long as the fore wings. *Palpi* very short, roughly clothed with hair-like scales. *Head* dull purplish fuscous. *Thorax* shining bronzy. *Fore wings* shining bronzy, without markings; the metallic scales are arranged in lines throughout, divided from each other by the darkened ground colour, which is scarcely visible between them. *Hind wings* purplish, with scarcely paler purplish cilia. *Abdomen* fuscous. *Legs* fuscous; the posterior tarsal joints faintly pale spotted. *Exp. al.* 8 mm.

Hab. Delagoa Bay (East Africa); five specimens (*Druce*).

Type, ♂, Mus. Wlsm.

A very small unicolorous species allied to *cupriacellus*, Hb.

HYPONOMEUTINÆ.

HYPONOMEUTA, *Z.*

Hyponomeuta subplumbellus, Wlsm.

Estcourt (Natal), one specimen (*Hutchinson*).

Hyponomeuta strigillatus, Z.

Hyponomeuta strigillatus, Z., Hand. Kong. Svensk. Vet.-Ak., 1852, 102—3.

N. syn. = *Hyponomeuta perficitellus*, Wkr., Cat. Lp. Ins. B. M., XXVIII., 531—2 (1863).

Delogoa Bay (East Africa), two specimens (*Druce*); Accra (Gold Coast), (*Carter*).

Hyponomeuta morbillosus, Z., Hor. Soc. Ent. Ross., XIII., 222—3, pl. III., 66 (1877).

Zanzibar.

This species was omitted from my previous paper (Trans. Ent. Soc. Lond., 1881).

[Pl. iv., fig. 27.]

Hyponomeuta puncticornis, sp. n.

Antennæ pale leaden grey, with a minute spot on the upper side of the basal joint. *Palpi* short, porrected; pale leaden grey, unspotted. *Head* pale leaden grey. *Thorax* pale leaden grey, with five black spots and one on the anterior half of each of the tegulæ; the thoracic spots are arranged as follows: two anterior adjacent; two median, more widely separated; one posterior, remote. *Fore wings* shining pale leaden grey, with about fifteen black spots; a line of four or five near the costal margin, the last only beyond the middle, the last but one about the middle; a line of four above the fold, the last slightly beyond the middle; a line of four below the fold, the last slightly beyond the outer spot of the middle line; two or three more near the apical margin before the cilia; cilia pale leaden grey. Under side dark greyish fuscous. *Hind wings* shining leaden grey, scarcely darker than the fore wings; cilia slightly darker than the hind wings. Under side slightly paler than in the fore wings. *Abdomen* dark greyish fuscous. *Exp. al.* 24 mm.

Hab. Delagoa Bay (East Africa), two specimens (*Druce*).

Type, ♂ ♀, Mus. Wlsm.

ŒTA, *Grote*.

[Pl. iv., fig. 28.]

Œta carteri, sp. n.

Antennæ somewhat serrated, thickened, purplish fuscous; apical third snow-white, spotted above with fuscous and tipped with fuscous. *Palpi* recurved to middle of face, purple. *Haustellum* orange. *Head* deep purple, with two conspicuous snow-white lateral spots behind the antennæ and two on the face. *Thorax* deep purple, with two anterior snow-white spots, somewhat smaller than those behind the antennæ; one central snow-white spot behind the middle, and two small snow-white lateral spots beneath

the tegulæ. *Fore wings* deep shining purple, with from fifteen to eighteen conspicuous snow-white spots, mostly circular; one at the middle of the base, three on the costa, of which two are on the basal half, and one at the commencement of the apical fourth, the latter somewhat produced downwards; two spots in the basal half on the dorsal margin, the first circular, the second smaller and semi-circular; between these and the first two of the costal spots is a large round spot crossing the fold; immediately beyond the middle of the wing are two similar ones, of which the lower one is the larger, and lies immediately below the fold; beyond these again is an elongate reniform spot, produced downwards to the fold; between this and the anal angle is another circular spot, not touching the dorsal margin; in the apical fourth of the wing are three spots, one somewhat reniform, produced downwards, but not parallel with the apical margin, the other two are above it, both circular, the outer one being the smaller; besides these spots above mentioned there are three or more very small spots, of which the most conspicuous are one between the two reniform spots, one above the first reniform spot, and one below the costal margin before the apex; cilia bright shining copper-brown. Under side dull fuscous, deep purple towards the apex and apical margin; a white spot on the costal margin at one-fourth from the apex, and a small white spot below and beyond it; these correspond with the similar spots on the upper side of which others are more or less visible. *Hind wings* copper-brown on the basal half, tending to purplish fuscous outwardly; cilia bright purple about the apex, copper-brown towards the base. Under side brownish, shading to deep purple at the apex, where there are two conspicuous white spots, the one on the costal margin, the other below and beyond it between veins 6 and 7; the costal spot only is visible on the upper side. *Abdomen* copper-brown, anal segment deep purplish fuscous. Under side bright purple, copper-brown at sides and base, with a white band at the commencement of the purplish colouring, followed by two white spots near it, and a conspicuous white patch on the penultimate segment. *Legs* bright purple, banded and spotted with white on the tibiæ; the anterior pair with two large white spots at the base of the femora. *Exp. al.* 24 mm.

Hab. Bathurst, May; one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

I have named this beautiful and distinct species after Mr. Gilbert T. Carter, to whom I am so deeply indebted for his assiduous efforts to increase my collection of African Micro-Lepidoptera.

GYMNOGRAMMA, *Z.*

[Pl. iv., fig. 29 ; Pl. vii., fig. 77.]

Gymnogramma hutchinsoni, sp. n.

Antennæ fuscous. *Palpi* leaden grey. *Head* fuscous, a collar of reddish orange dividing the head from the thorax. *Thorax* leaden grey. Under side leaden grey, orange-red in front near the head. *Fore wings and cilia* unicolorous leaden grey. Under side orange reddish, except the outer third and costal margins, which are fuscous. Neuration 12 veins; all separate; with a supplementary cell caused by 5 being continued through the cell to the base of 11; 1 forked at base. *Hind wings and cilia* orange-red. Under side orange-red, except at the base. Neuration 8 veins; with a supplementary cell; the internal nervule commences near the base of 6, and is curved downwards, encroaching on the lower cell; 3 and 4 from a point at lower angle of cell; 2 from slightly beyond outer third of cell. *Abdomen* fuscous, fringed with orange-red at the sides posteriorly; the anal segment entirely orange-red. Under side orange-red, except at the base. *Exp. al.* 16 mm.

Hab. Estcourt (Natal), three specimens (*Hutchinson*).

Type, ♂ ♀, Mus. Wlsm.

This species differs from *G. rufiventris*, Z., in the absence of a dark apical margin and cilia to the upper side of the hind wings, and in its leaden rather than brown fore wings.

EUSTIXIS, *Hb.*

Eustixis flavivittella, Wlsm.

Delagoa Bay (East Africa), two specimens (*Druce*); Estcourt (Natal), one specimen (*Hutchinson*).

PLUTELLINÆ.

PLUTELLA, *Schrk.*

Plutella cruciferarum, Z.

Grahamstown (Cape Colony), 16 specimens (*Druce*); Estcourt (Natal), five specimens (*Hutchinson*); Gambia, two specimens (*Druce*).

Not hitherto recorded from South or West Africa.

GELECHIANÆ.

GELECHIA, *Z.*

Gelechia rescissella, Z.

Estcourt (Natal), one specimen (*Hutchinson*).

Gelechia zetterstedtiella, Z.

Estcourt (Natal), seven specimens (*Hutchinson*).

Gelechia aglossella, Wkr., Cat., Lp. Ins. B. M., XXXV., 1830—1 (1866).

Cape.

This species was omitted from my previous paper.

[Pl. iv., fig. 30.]

Gelechia hutchinsonella, sp. n.

Antennæ brownish fuscous, faintly pale-spotted above, paler beneath. *Palpi* pale stramineous, banded with fuscous before the end of the apical joint, and with a brownish fuscous spot at the base of the second joint externally. *Head* pale stramineous. *Thorax* stramineous; patagia with a brown spot at their base. *Fore wings* stramineous, with a brownish fuscous spot at the extreme base of the costa, thence shaded with greyish fuscous along the costal margin nearly to the commencement of the costo-apical cilia; along the centre of this costal shade a line of chestnut scales can be traced in fresh specimens, reaching to half the length of the wing; contiguous to the lower edge of the costal shade, but before the middle, is a distinct black spot; a conspicuous greyish fuscous patch lies on the dorsal margin contiguous to the anal angle, its rounded inner edge narrowly margined by a line of black scales, its outer extremity touched with chestnut; this patch is connected at the anal angle with a shade of the same colour, which follows the apical margin to the apex, interrupted only by a small marginal spot of the pale stramineous ground colour, immediately below the apex, by which the darker shade appears to be deflected inwards; cilia greyish fuscous. *Hind wings and cilia* grey. *Abdomen* grey. *Legs* greyish, faintly pale-speckled. *Exp. al.* 10—14 mm.

Hab. Estcourt (Natal), eight specimens (*Hutchinson*). Tangani (Kolumbi Creek, East Africa), August, one specimen (*Jackson*).

Type, ♂ ♀, Mus. Wlsm.

[Pl. iv., fig. 31.]

Gelechia palpigera, sp. n.

Antennæ ochreous. *Palpi* dark brown, with the apical joint and a spot at the apex of the second joint white. *Head and Thorax* greyish ochreous. *Fore wings* greyish ochreous, paler along the base of the costal half; a brown spot at the extreme base of the costal margin is connected by a slender line along the margin with a brown shade on the outer half of the costa, which, commencing very obliquely, is margined internally by a whitish line, and interrupted about half-way to the apex by a similar, slender, very oblique whitish line running to a whitish subapical patch (not visible in every specimen), below which are a few dark scales at the base of the dorsal cilia; on the wing-surface a small fuscous spot lies beyond the end of the cell, opposite the base of the second white costal streak; and in another specimen this is preceded by two similar spots, one on the fold and one on the disk, about equidistant from the other two; cilia greyish ochreous. Under side unicolorous brownish ochreous. *Hind wings and cilia* dark grey. *Abdomen* brownish ochreous. *Legs* greyish ochreous. *Exp. al.* 14—17 mm.

Hab. Delagoa Bay (East Africa), two specimens (*Druce*).

Type, ♂ ♀, Mus. Wlsm.

The larger specimen has the three spots, the smaller only one.

Brachmia, *Hein.*

Brachmia trigella, Z.

Estcourt (Natal), two specimens (*Hutchinson*).

Brachmia subsecivella, Z.

Estcourt (Natal), one specimen (*Hutchinson*).

Anacampsis, *Crt.*

Anacampsis lamprostoma, Z.

Gelechia lamprostoma, Z., Is., 1847, 851.

N. syn. = *Gelechia zulu*, Wlsm., Trans. Ent. Soc. Lond., 1881, 261—2.

Gelechia zulu, Wlsm., must be regarded as a synonym of *lamprostoma*, Z. This species appears to be widely distributed; it occurs in Sicily, Spain, Asia Minor, and India, as well as Africa.

Bathurst (Gambia), November, two specimens (*Carter*); Estcourt (Natal), one specimen (*Hutchinson*).

PTOCHEUUSA, *Hein.*

Ptocheuusa? cemiostomella, Z., Hor. Soc. Ent. Ross., XIII., 357—8 (1887).

Zanzibar.

This species was omitted from my previous paper.

POLYHYMNO, *Chamb.*,
Can. Ent., VI., 246—7 (1874).

N. syn. = *COPOCERCIA*, Z., Hor. Soc. Ent. Ross., XIII., 374—5 (1877).

The type of *Polyhymno*, Chamb., is *Polyhymno luteostrigella*, Chamb., a species occurring in the United States. This species is figured Pl. VII., fig. 78.

Copocercia was described by Zeller for the reception of *Copocercia crambinella*, Z., from Ubaque.

I have several specimens of *Polyhymno luteostrigella*, Chamb., and the type of *Copocercia crambinella*, Z.; there can be no doubt that they are congeneric. *Polyhymno* takes precedence.

The neuration is as follows:—

Fore wings 12 veins; 7 and 8 from a common stem, 7 to costa immediately above apex; rest separate, 2 from near angle of cell; 1*b* furcate at base. *Hind wings* 8 veins; 3 and 4 very short, stalked (almost from a point); 6 and 7 stalked, 6 to apical margin, 7 to costa. *Ocelli* present.

[Pl. iv., fig. 32.]

Polyhymno cleodorella, sp. n.

Antennæ brownish. *Palpi* white, tinged with brown on the under side towards the apex. *Head* shining creamy white. *Thorax* brown; tegulæ shining white. *Fore wings* falcate at the apex; brown, with shining white longitudinal streaks and ante-apical costal geminations; a wide central white streak from the base, slightly nearer to the costal than to the dorsal margin, is attenuated beyond the middle, and almost reaches the apical margin below the falcate apex; a more slender line of white on the extreme costal margin from near the base is deflexed about the middle of the costal margin, and runs very obliquely outwards, ending slightly beyond and above the end of the central streak; a third

white line, starting at the basal third below the fold, crosses the fold beyond the middle, and is somewhat dilated towards its apex, opposite to the middle of the apical margin and on a level with the apex of the upper line; this third line gives off a short oblique branch beneath, which commences on and follows the fold to near the anal angle; there are three short outwardly oblique costal streaks immediately before the apex, and two minute ones above the apex itself in the apical cilia; the ends of the cilia are brown at the extreme apex, with a minute spot of blackish scales lying beneath the projected point; cilia on the apical margin white, with a brown line along their base, within which is a slender parallel white one; cilia at the anal angle tinged with brown. *Hind wings* deeply emarginate below the pointed apex; brownish grey; cilia pale greyish brown, faintly touched with whitish below the apex. *Abdomen* brownish. *Legs* brown, touched with whitish spots on the posterior tarsal joints. *Exp. al.* 12 mm.

Hab. Bathurst (Gambia); "Three specimens taken in November and December" (*Carter*).

Type, ♂, Mus. Wlsm.

This species differs but little from the South American *Copocercia crambinella*, Z., except in the arrangement of the costal streaks, and in the more conspicuous third line of white crossing the fold. *Polyhymno luteotactella*, Chamb., is very similar, but distinct.

[Pl. iv., fig. 33.]

Polyhymno ? tenuis, sp. n.

Antennæ with the basal joint elongate, narrow at the base, slightly enlarged towards its apex; white at the base, shaded with brown beyond the basal third. *Palpi* long, slender, recurved; white. *Head and Thorax* shining white. *Fore wings* slender, falcate at the apex; shining white, with the apex, one costal, and two dorsal oblique streaks, greyish brown; the first dorsal streak commences at one-fourth from the base, is short, stout, outwardly oblique, and reaches to the fold; the second dorsal streak commences about the middle of the dorsal margin, is wide at its base, tapering upwards in a very oblique outward direction, crossing the fold, and attenuated to a slender line in the direction of the apex, before which it meets the scarcely less oblique but much shorter costal streak, which commences at about one-third from the apex; beyond and near the costal streak is a greyish brown shade extending to the apex; at the extreme apex is a dark brown spot,

narrowly set in white, to which two slender greyish brown streaks running through the white apical cilia give an eye-like effect; these streaks are bent downward at the apex, and, together with a large patch of brown scales in the subapical cilia, increase the falcate appearance to the wing-tip; they are distinctly visible on the under side; cilia at the anal angle pale brownish grey. *Hind wings* deeply emarginate beneath the much prolonged and slender apex; pale shining grey; cilia faintly brownish tinged, with a distinct brownish fuscous transverse streak running through them at the extreme apex, and very near their outer points. *Abdomen* greyish white. *Legs* white, spotted with brownish. *Exp. al.* 9—10 mm.

Hab. Bathurst (Gambia), three specimens (*Carter*).

Type, ♂, Mus. Wlsm.

This species is perhaps not properly referred to *Polyhymno*, but it is hardly advisable to create a new genus for its reception at present. Its more slender hind wings distinguish it from the typical form of this genus.

Strobisia, *Clem.*

The neuration of this genus is as follows :—

Fore wings 12 veins; 7 and 8 from a common stem; or 11 veins, 7 absent (coincident with 8); 2 and 3 from a curved common stem; rest separate; 1 *b* furcate at base. *Hind wings* 8 veins; 3 and 4 from a point at angle of cell; 6 and 7 from a point; 1 *b* furcate at base.

[Pl. iv., fig. 34; Pl. vii., fig. 79.]

Strobisia metallica, sp. n.

Antennæ pale yellow, spotted with black on the upper side of each joint. *Labial palpi* long, recurved, acuminate; apical joint slightly longer than the second; externally whitish, slightly clouded with grey, especially on the inner side. *Head* greyish fuscous; face shining whitish grey. *Thorax* greyish fuscous, with a brownish tint posteriorly. Under side pale greyish ochreous. *Fore wings* elongate, apex depressed, apical margin scarcely oblique; bronzy brown on basal two-thirds, streaked with fuscous between the metallic markings, which are as follows: first a conspicuous bright steel-blue stripe along the costa from base, depressed and somewhat widened before the middle of the wing, ending above the fold at about half the wing-length; this stripe is

slightly dark-margined throughout; below it is a streak of a similar colour running along the fold from the base, and ending before the middle of the fold closely above a detached elongate spot of the same metallic steel-blue, lying immediately below the fold beyond its middle; at two-thirds the wing-length are two conspicuous lilac metallic spots, the first, costal, reaching less than half-way across the wing, the other, dorsal, almost connected with it, and occupying more than half the width of the wing; these are also distinctly dark-margined; beyond them is a broad bright orange-yellow fascia completely crossing the wing; the apical portion of the wing is fuscous, containing three small metallic spots, parallel with the apical margin, and separated from it by an orange streak; cilia bright steel-blue, separated by a dark line from the orange streak. Under side uniformly smooth, shining greenish grey. *Hind wings* brownish fuscous; cilia grey. Under side shining greenish grey. *Abdomen* brownish fuscous. Under side pale greyish ochreous. *Legs* brownish fuscous, spotted with whitish at the joints; spurs whitish. *Exp. al.* 11 mm.

Hab. Bathurst (Gambia), one specimen among a species of mallow in November (*Carter*).

Type, ♀, Mus. Wlsm.

Brachycrossata, *Hein.*

The genus *Brachycrossata* has 12 veins in the fore wings; 7 and 8 from a common stem; 2 and 3 separate and parallel. There are 8 veins in the hind wings; 3 and 4 from a point at lower angle of cell; 6 and 7 from a point at upper angle of cell.

The genus, as thus defined, is of very limited extent. A considerable number of species occur in the Indian region, and also in Africa, which agree with *Brachycrossata* in all particulars, *except* that veins 2 and 3 of the fore wings rise from a recurved common stem. This difference in neuration may be sufficient to constitute another genus, but for the present it would be rash to give it a name, as it has most probably been already described by Walker without reference to the neural characters. It will be better for the present at least to divide *Brachycrossata* into two sections, thus :—

A. Veins 2 and 3 of the fore wings separate.

B. Veins 2 and 3 of the fore wings arising from a recurved common stem.

Brachycrossata, Sect. B.

Brachycrossata septella, Z.

Gelechia (*Nothris*) *septella*, Z., Hand. Kong. Svensk. Vet.-Ak., 1852, 108—9.

Bathurst (Gambia), seven specimens (*Carter*); Tangani (Kolumbi Creek, East Africa), August, one specimen (*Jackson*).

[Pl. iv., fig. 35.]

Brachycrossata marginata, sp. n.

Antennæ pale fawn-brown, the basal joint shaded with greyish fuscous. *Palpi* slender; pale fawn-brown on their inner sides and at the end of the apical joint; otherwise pale greyish fuscous. *Head* dull fawn-brown, shaded with greyish fuscous on the face and vertex. *Thorax* dull fawn-brown. *Fore wings* pale fawn-brown; a discal spot before the middle and a band of even width from the apex to the anal angle, but not reaching the costal margin, greyish fuscous; there is also an obscure outwardly oblique costal streak of the same colour before the apex; a very faint indication of a second spot at the end of the cell; cilia pale fawn-brown. Under side pale greyish fuscous. *Hind wings* greyish fuscous, with scarcely paler cilia. *Abdomen* greyish fuscous; the ♂ with a strong ochreous anal tuft. *Exp. al.* 15—17 mm.

Hab. Bathurst (Gambia), five specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

This species agrees with *septella*, Z., in having veins 2 and 3 of the fore wings from a curved common stem.

Odites, gen. n.

(ὁδίτης = traveller.)

Type. *Odites natalensis*, Wlsm.

[Pl. vii., fig. 80.]

Antennæ simple; basal joint slightly thickened, without pecten. *Labial palpi* slender, recurved; apical joint nearly equal in length to the second joint, sharply acuminate; second joint clothed with appressed scales, which do not project beyond it. *Maxillary palpi* short, meeting over the base of the haustellum. *Haustellum* moderately long, scaled at the base. *Ocelli* obsolete. *Head* slightly roughened. *Fore wings*, apex produced, costal margin scarcely convex, apical margin oblique. *Neuration* 12 veins; 7 and 8 from a common stem enclosing the apex; rest separate; 2

from near angle of cell; an internal vein runs from between 5 and 6 to near base of 11. *Hind wings* trapezoidal, with produced apex and oblique outer margin. *Neuration* 8 veins; 6 and 7 from a common stem; 3 and 4 from a point, or from a common stem, from the lower angle of cell; 5 from or near angle of cell. *Legs:* hind tibiæ clothed with smooth appressed scales.

This genus will probably be found to include a number of forms from various parts of the world, which have hitherto been confounded with Zeller's genus *Cryptolechia,* from which they differ in having veins 6 and 7 of the hind wings from a common stem, instead of separate and nearly parallel, as in his original type of that genus, *Cryptolechia straminella,* from South Africa.

If the name *Cryptolechia* is to be retained for the species originally described as the type of that genus,—and I fail to see how the rule can be departed from in this instance,—any family founded upon an alliance with that genus must at least retain its essential characters, and cannot be established to include the forms in which veins 6 and 7 of the hind wings are not separated, this wide difference in neuration being admitted by all authorities to be of the utmost importance in systematic classification. It follows that Zeller's genus *Cryptolechia* falls into the family *Œcophoridæ* of Meyrick, and annihilates Meyrick's family *Cryptolechidæ,* which was not founded on the typical form. Mr. Meyrick, recognising this, has since recharacterised his family *Cryptolechidæ* under the name *Xyloryctidæ* (Tr. Roy. Soc. South Australia, 1890, 23—4).

I have explained that it is necessary to establish this genus *Odites* on the strength of its neural characters; these exhibit affinities to the family *Gelechidæ* of Heinemann rather than to the *Œcophoridæ* of Meyrick, and moreover distinguish it from all genera yet described, not only in the now suppressed family *Cryptolechidæ,* but even more strongly from the *Œcophoridæ* which may be retained, provided always that they agree with the original typical *Œcophora,* whatever that may be. The error, for which Mr. Meyrick cannot rightly be held responsible, has evidently arisen through the confusion which Zeller created by his attempts to expand and amplify his original work. These attempts (Lin. Ent., IX., 353, *et seq.* (1854), and Hor. Soc. Ent. Ross., XIII.,

258—261 (1877)) had the effect of supplanting his original descriptions, and served rather to obscure the classification than to render it more correct or more easy of comprehension. *Cryptolechia straminella* having been described originally as the type of the genus (Hand. Kongl. Svensk. Vet.-Ak., 1852, 107), he subsequently recharacterised the same genus in an expanded form, making *Depressaria* (*Volucra*) *flava*, from South America, the typical species (Lin. Ent., IX., 353—5 (1854)), incorrectly using the expression "venæ simplices," whereas veins 7 and 8 of the fore wings in that species are from a common stem, and, in fact, the species agrees in all points with *straminella*.

In the Horæ Soc. Ent. Ross., XIII., 259 (1877), he removed *C. straminella* to *Machimia*, retaining *flava* in *Cryptolechia* in defiance of the fact that their characters are identical, and differ from *tentoriferella*, Clem., the type of *Machimia*, in the remoteness, at its origin, of vein 2 from vein 3, which arises at the lower angle of the cell of the fore wings.

With regard to *Stenoma*, which was described by Zeller (Isis, 1839, 195), and included *griseanum*, *litura*, and *bicolor*, alike in structure and neuration; in the Lin. Ent., IX., 391—3 (1854), he identified *griseanum* as *walchiana*, Cram., and founded the genus *Antæotricha* for its reception, together with some allied species. He then removed *litura* and *bicolor* to *Cryptolechia* (presumably *Cryptolechia* No. 2), from which they differ, as from No. 1, in having veins 7 and 8 of the fore wings, as also 6 and 7 of the hind wings, separate, corresponding therefore to his statement "*venæ simplices*," but not to his selected type. In the Horæ Soc. Ent. Ross., XIII., 258—261 (1877), he still further extended his genus *Cryptolechia*, including many modified forms as subgenera. He here resuscitated *Stenoma* (of which, as I have shown, the original type was *griseanum* = *walchiana*), and, having got rid of the other species placed in it in the first instance, he left *litura* as the type at the head of his list, placing *bicolor* in a different subsection, and omitting *griseanum* altogether, although the three are identical in structure.

In pointing out these inconsistencies I have had the great advantage of possessing nearly the whole series of Zeller's generic types, in many cases the actual speci-

mens used by him in writing his descriptions, and where these are not available, specimens of each species from his own collection, named in his handwriting.

It is not surprising that Mr. Meyrick, without the guidance of such valuable material, should have apparently failed to identify the precise form of neuration characteristic of the original genus *Cryptolechia*, which is as follows :—

Fore wings 12 veins; 2 from near lower angle of cell; 7 and 8 from a common stem, the fork enclosing the apex; the rest separate. *Hind wings* 8 veins; 3 and 4 from a point at lower angle of cell; 5 bent over at its origin and somewhat approximate to 4; 6 and 7 separate, almost parallel; 1*b* furcate at base; 8 joined to upper edge of cell by a cross vein. [Pl. VII., fig. 86.]

As touching this question of neuration, I may perhaps here remark that one at least of the characters on which the *Tortricidæ* have hitherto been separated from the *Tineidæ* will be found insufficient. It is well known that in all the *Tortricidæ*, and in many of the *Tineidæ*, vein 1 of the hind wings—that is, the vein nearest to the abdominal margin—is divided into 3 veinlets. De Peyerimhoff, in his 'Étude sur l'organisation extérieure des Tordeuses' (Ann. Soc. Ent. France (ser. 5), VI., 523—590, pl. X.—XII. (1876)), pointed out that the middle veinlet of these three was furcate at the base, and relied upon this character as distinguishing the family from the allied *Tineidæ*. My assistant, Mr. Durrant, has carefully searched for this character in the subfamilies and genera of the *Tineidæ*, and finds it not only in species allied to *Euplocamus*, to *Gelechia*, to *Œcophora*, to *Atychia*, and in Meyrick's *Xyloryctidæ*, but in the typical *Tinea tapetzella*, L., itself; in short, almost wherever he has looked for it.

[Pl. iv., fig. 36.]

Odites natalensis, sp. n.

Antennæ brownish. *Palpi* slender, recurved, ochreous, shaded with brown externally to beyond the middle of the second joint. *Head* rough; pale straw-yellow, shaded with brownish around the eyes. *Thorax* pale straw-yellow. *Fore wings* pale straw-yellow to beyond the middle, slightly shaded with brown on the extreme costal margin near the base; beyond the middle is a slightly waved

transverse purplish fuscous line, beyond which the remainder of the wing is entirely shaded with pale brown, or brownish ochreous; cilia scarcely paler than the apical portion of the wing. *Hind wings* very pale greyish ochreous; cilia the same. *Abdomen* grey anal tuft ochreous. *Legs* ochreous. *Exp. al.* 17 mm.

Hab. Estcourt (Natal), six specimens (*Hutchinson*).

Type, ♂ ♀, Mus. Wlsm.

[Pl. v., fig. 37.]

Odites carterella, sp. n.

Antennæ brown at the base, fading to ochreous towards their outer extremities. *Palpi* pale stramineous ochreous, shaded externally with brown on the basal portion of the second joint. *Head* pale stramineous ochreous. *Thorax* dark brown. *Fore wings* shining pale stramineous ochreous, with a very short dark brown basal patch, of which the outer margin is slightly bulged below the middle; cilia the same colour as the wings. *Hind wings* shining whitish, with a faint greyish ochreous tinge; cilia the same. *Abdomen* pale greyish ochreous. *Legs* pale stramineous ochreous. *Exp. al.* 15 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂, Mus. Wlsm.

This species is somewhat similar in appearance to *Depressaria culcitella*, H.-S.

Odites atropunctella, Wlsm.

Cryptolechia atropunctella, Wlsm., Trans. Ent. Soc. Lond., 1881, 256.

Estcourt (Natal), one specimen (*Hutchinson*); Cape Colony, one specimen (*Trimen*).

[Pl. v., fig. 38.]

Odites? inconspicua, sp. n.

Antennæ stone-colour. *Palpi* stone-colour, paler on their inner surface. *Head and Thorax* stone-colour. *Fore wings* unicolorous stone-colour; with two small darker stone-coloured spots, one on the middle of the wing, the other in the same line with it on the end of the cell; cilia stone-colour. *Hind wings and cilia* pale

stone-grey. *Abdomen* stone-grey, anal tuft inclining to ochreous. *Legs* stone-grey. *Exp. al.* 13 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

This species differs from the typical form in having veins 2 and 3 of the fore wings from a curved common stem.

IDIOPTERYX, gen. n.

(ἴδιος=peculiar, πτέρυξ=a wing.)

Type. *Cryptolechia obliquella*, Wlsm.

[Pl. vii., fig. 81.]

Antennæ ciliate ½; basal joint slightly thickened, without pecten. *Labial palpi* slender, recurved; apical joint nearly as long as the second; second joint clothed with appressed scales, which do not project beyond it. *Maxillary palpi* short, appressed to base of haustellum. *Haustellum* moderately long, scaled at base. *Ocelli* obsolete. *Head* clothed with appressed scales. *Fore wings*, apex produced, costal margin scarcely convex, apical margin oblique. *Neuration* 12 veins; 8 and 9 out of 7, 7 to costa; 3 and 4 out of 2, 2 curved from angle of cell; 5 arising immediately above 2; 1 furcate at base; internal vein from between 5 and 6. *Hind wings* broader than fore wings; apex slightly produced, rounded; outer margin oblique. *Neuration* 8 veins; 6 and 7 from a common stem, 6 to costa, 7 to outer margin; 3 and 4 separate; 5 continued through cell to base; 8 connected with upper margin of cell by a cross-vein near base; 1*b* furcate at base. *Legs:* hind tibiæ thickly clothed with long rough hair-scales.

Idiopteryx obliquella, Wlsm.

Cryptolechia obliquella, Wlsm., Trans. Ent. Soc. Lond., 1881, 254—5.

Estcourt (Natal), two specimens (*Hutchinson*).

LECITHOCERA, *H.-S.*

[Pl. v., fig. 39.]

Lecithocera marginata, sp. n.

Antennæ longer than the fore wings; pale ochreous. *Palpi* recurved; tawny fuscous; the apical joint equal in length to the second joint. *Head and face* tawny fuscous, pale ochreous at the sides and over the eyes. *Thorax* tawny fuscous; tegulæ pale

ochreous. *Fore wings* tawny fuscous, narrowly pale ochreous along the costa to a little beyond the middle; this pale ochreous costal streak is wider at the base, tapering outwards, and there is a fuscous shade on the extreme costal margin at the base; on the dark portion of the wing are two small obscure dark tawny brown spots, one at the upper edge of the cell before the middle, another just beyond the middle at the end of the cell, and equidistant from the costal and dorsal margins; cilia tawny grey. *Hind wings* grey; cilia tawny grey. *Abdomen* tawny grey, with paler anal tuft. *Exp. al.* 14 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

[Pl. v., fig. 40.]

Lecithocera flavipalpis, sp. n.

Antennæ thickened, especially towards the middle, shorter than the fore wings; bronze-colour. *Palpi* recurved, twice the length of the head; second joint thickened with closely appressed scales beneath; apical joint slender, acute. *Haustellum* pale ochreous. *Head* bronzy above, orange-yellow at the sides. *Thorax* bronze-colour. *Fore wings* rounded at the apex, the costa scarcely convex near the base, apical margin obliquely convex; deep bronze-colour, without markings (under the lens minutely irrorated with paler scales); cilia shining bronzy. *Hind wings* wide, not emarginate below the slightly rounded apex; paler than the fore wings, bronzy fuscous; cilia the same, rather shining. *Abdomen* dark bronzy fuscous. *Legs* pale ochreous, tinged with bronzy fuscous on the posterior tarsal joints. *Exp. al.* 18 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♀, Mus. Wlsm.

Lecithocera maculata, Wlsm.

Tangani (Kolumbi Creek, East Africa), August, one specimen (*Jackson*).

Timyra, *Wkr.*

[Pl. v., fig. 41; Pl. vii., fig. 83.]

Timyra extranea, sp. n.

Antennæ ochreous; ♂ with a long and conspicuously projecting tuft of greyish scales beneath the outer side of the basal joint; in

the ♀ simple. *Palpi*, ♂, long, recurved, above the crown thickly clothed with long diffuse ochreous hair-like scales on the upper side to the end of the rather stout, pointed apical joint, which is two-thirds the length of the second joint; in the ♀ very slender and naked. *Head* ochreous, thickly tufted above the eyes. *Thorax* ochreous. *Fore wings* ochreous, faintly and delicately shaded with brownish ochreous on the basal and outer thirds of the wing-length; two faintly indicated brownish ochreous discal spots, one at the end of the basal third, the other at the commencement of the outer third, precede and follow the paler central space; cilia ochreous. *Hind wings* delicately fringed with pale hairs on the upper side of the subcostal vein; pale ochreous, narrowly bordered in the ♂ around the apex and apical margin with brownish ochreous; cilia very pale ochreous. *Abdomen* pale brownish ochreous. *Legs* pale ochreous; the joints above the spurs tufted, above the first pair strongly, above the second pair less conspicuously, with brush-like tufts, ochreous, with a bronzy-brown band running across their outer ends. *Exp. al.* 14—15 mm.

Hab. Bathurst (Gambia), Mr. G. T. Carter; three specimens.

Type, ♂ ♀, Mus. Wlsm.

This genus appears to belong properly to the Indian region; it has occurred in Ceylon, and I believe also in India. This species is closely allied to *Timyra phycisella*, Wkr.

Apiletria, *Ld.*

[Pl. v., fig. 42; Pl. vii., fig. 82.]

Apiletria acutipennis, sp. n.

Antennæ simple, two-thirds the length of the fore wings; basal joint elongate, slightly enlarged; dull cinereous. *Palpi* recurved; second joint long, stout, and compactly clothed; apical joint short, slender, acute; whitish cinereous above, sprinkled with dusky scales beneath. *Haustellum* rather short. *Ocelli* obsolete. *Head* smooth, greyish cinereous. *Thorax* stout, smooth; cinereous, anteriorly shaded with dark grey, a whitish line dividing its anterior margin from the head. *Fore wings* lanceolate, acute; costal margin slightly convex, especially towards the base, extreme apex rounded, apical margin very oblique, anal angle obsolete, dorsal margin somewhat bulged near the base; pale cinereous, sparsely sprinkled with elongate fuscous scales, much shaded along the costal margin and on the dorsal margin about the obsolete anal angle with brown and greyish fuscous; with two small fuscous

spots, the first at about half the wing-length, slightly above the middle, the second on the same level beyond it, less than half-way to the apex; cilia greyish cinereous. *Neuration*, vein 2 from near the middle of the wing-length, carried forward above the obsolete anal angle; 7 and 8 from a common stem; rest separate. *Hind wings* elongate, subovate, about the same width as the fore wings, apex rounded, with very long cilia at the abdominal angle; greyish cinereous, with slightly paler cilia, near the base of which runs a darker line. *Neuration* 8 veins; 3 and 4 from a point; 6 and 7 from a common stem. *Abdomen* dilated, acute, brownish grey. *Legs* cinereous, sprinkled with ashy brown. *Exp. al.* 26 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

YPSOLOPHUS, *F.*

Ypsolophus siccifolii, Wlsm.

Malvern (Natal), one specimen (*Bowker*).

[Pl. v., fig. 43.]

Ypsolophus gigas, sp. n.

Antennæ, in the ♂, pubescent; brownish bone-colour. *Palpi* with a very long projecting tuft beneath the second joint, almost as long as the long slender apical joint, projecting three times the length of the head beyond it; brownish bone-colour. *Head and Thorax* brownish bone-colour. *Fore wings* with the costa straight, the apex depressed, but rather pointed, the apical margin very oblique; pale bone-brownish, sparsely irrorated with a few darker scales, and with three indistinct darker spots, one on the fold at half its length, and two at the outer extremity of the discal cell, one at its upper, the other at its lower angle; cilia unicolorous with the fore wings. *Neuration*, 4 and 5 closely approximate at the base; 7 and 8 from a common stem, 8 ending above the apex; 2 and 3 separate. *Hind wings* somewhat paler than the fore wings, with an indistinct darker line running along the base of the still paler cilia. *Neuration*, 3 and 4 from the same point; 6 and 7 separate. *Abdomen* the same colour as the hind wings, but with about six transverse darker brown segmental bars, corresponding in colour with the three spots on the fore wings, and with a pale anal tuft. *Exp. al.* 40 mm.

Hab. Estcourt (Natal).

Type, ♂, Mus. Wlsm.

Two specimens of this very remarkable large form of the genus *Ypsolophus* have reached me from Mr. J. M. Hutchinson.

[Pl. v., fig. 44.]

Ypsolophus marmoratus, sp. n.

Antennæ annulated with fuscous and pale greyish ochreous. *Palpi* with a strong triangular tuft on the second joint; greyish fuscous, faintly speckled with ochreous; apical joint dull ochreous, with a fuscous ring before the apex. *Head* greyish fuscous, slightly tinged with ochreous above and in front. *Thorax* dull ochreous, shaded with fuscous. *Fore wings* dull ochreous, mottled and shaded with fuscous; with an ill-defined fuscous spot on the disc about the middle; cilia dull ochreous; veins 2 and 3 stalked. *Hind wings and cilia* grey. *Abdomen* greyish fuscous. *Legs* obscurely mottled with greyish fuscous and pale ochreous. *Exp. al.* 12 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

Nothris, *Hb.*

[Pl. v., fig. 46.]

Nothris bryophilella, sp. n.

Antennæ dull white, faintly annulated with fuscous. *Palpi* with the second joint clothed with a long projecting tuft of loose hair-like scales beneath; white, a large black spot on the outer side of the second joint, a very small black spot at the base, and a black band around the middle of the slender apical joint. *Head and Thorax* dull white. *Fore wings* dull white, speckled and blotched with brown; the basal third is irrorated with brown scales, a small fuscous spot near the costa towards the base; immediately beyond the basal third is a large reniform greyish fuscous spot, having the appearance of two roundish contiguous spots, the one reaching over the fold, the other, about the same size, above it; beyond this is a transverse ill-defined band of brown about the middle of the wing, starting from the costal but not attaining to the dorsal margin, wider towards its upper end; this band is followed by another greyish fuscous rounded spot, larger than either of the other two, and lying on the end of the cell; this spot is followed by another large brown patch, occupying the whole apical portion of the wing

from the anal angle along the apical margin, but not quite reaching to the costal margin, where there are three fuscous spots, two small and one larger; a slender shining leaden grey line borders the wing, running from the anal angle along the extreme apical margin, and around the apex along the base of the costal cilia; cilia cinereous, with two darker lines, one along their base, the other along their outer edge. *Hind wings* pale leaden grey; cilia cinereous. *Abdomen* cinereous. *Legs* whitish, the posterior tibiæ with long hairs above, the tarsi spotted with brownish fuscous. *Exp. al.* 13—14 mm.

Hab. Bathurst (Gambia); four specimens taken in November (*Carter*).

Type, ♂, Mus. Wlsm.

This species bears a great resemblance in colour and markings to *Bryophila perla* and *glandifera*.

Megacraspedus, *Z.*

[Pl. v., fig. 47.]

Megacraspedus suffusellus, sp. n.

Antennæ whitish cinereous. *Palpi* whitish, dusted with cinereous, especially on their outer sides along the lower edge of the long projecting tuft from the second joint. *Head and Thorax* whitish, dusted with cinereous. *Fore wings* whitish, dusted with cinereous, the darker dusting forming diffused and by no means distinct spot-like marks below the costa at the basal third, at the end of the cell, and on the fold; cilia dirty whitish, with a cinereous line along their middle, and another before their tips. *Hind wings* very pointed, with margin deeply excised below the apex; shining bone-white; cilia whitish cinereous. *Abdomen* cinereous, barred with dirty whitish. *Legs* whitish cinereous. *Exp. al.* 18 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

This species may possibly be only a local form of the European *Megacraspedus imparellus*, F. R., but it differs in the absence of distinct spots on the fore wings, and in its generally more dirty and suffused appearance.

Anorthosia, *Clem.*

Anorthosia straminis, Wlsm.

Ypsolophus straminis, Wlsm., Trans. Ent. Soc. Lond., 1881, 266.

Grahamstown (Cape Colony), one specimen (*Druce*); Delagoa Bay (East Africa), one specimen (*Druce*).

This species only differs from *Anorthosia punctiferella*, Clem., the type of the genus, by having 11 veins in the fore wings (7 and 8 being coincident) instead of 12 veins, 7 and 8 from a common stem.

In my former paper I had placed it in the genus *Ysolophus*, which has the same neuration as *Anorthosia*, but the form of the palpi agrees far more closely with the latter genus. The neural characters of *Anorthosia*, as figured in Stainton's edition of Clemens' papers (Tin. N. Am., p. 111), is not precisely correct; veins 3 and 4 of the hind wings should be separated at the base, and the discal cell of both wings is closed, as in other allied genera.

[Pl. v., fig. 45; Pl. vii., fig. 84.]

Anorthosia fracticostella, sp. n.

Antennæ dirty whitish, annulated with brown. *Palpi:* second joint thickly clothed with projecting scales taking a triangular form; externally brown, fringed with whitish at its anterior edge, internally whitish throughout; apical joint very long, slender, erect, slightly recurved, whitish, springing from the apex of the triangular tuft of scales, not, as is usual in *Ypsolophus*, from the base; in this respect it agrees approximately with *Anorthosia*, Clem., rather than with *Ypsolophus*, in which I was at first inclined to place it, although differing somewhat from both in the form of the apical joint. *Head and Thorax* pale olive-green. *Fore wings* with the costa slightly convex near the base, depressed beyond the middle, with a projection before the oblique depressed apex, which is rather obtusely pointed, the apical margin oblique and concave, anal angle obtuse, dorsal margin straight; pale olive-green; a small brown streak along the extreme base of the costal margin, followed by a few brown scales on the convex part of the margin near the basal third of the wing-length; a distinct dark brown narrow line-like spot along the extreme costal margin, scarcely beyond the middle, and a few brown scales in the cilia of the preapical costal projection; just before the middle of the wing

is a reduplicated brown spot, the upper portion of which is almost round; the lower portion is triangular, with the apex pointing outwards; at the lower angle on the fold is a roundish spot of a darker brown; at the end of the cell is an obliquely-placed linear spot of dark brown scales; five small spots of the same colour are at the extreme edge along the apical margin, with three similar spots above the apex, between it and the costal projection; two similar spots also occur on the dorsal margin; cilia very pale greyish brown. Under side unicolorous pale brownish grey. *Hind wings* wider than the fore wings, the outer margin scarcely concave below the apex; pale greyish brown, with scarcely paler cilia. Under side unicolorous pale brownish grey. *Abdomen* pale greyish brown, inclining to ochreous posteriorly. *Legs* pale greyish ochreous. *Exp. al.* 15—16 mm.

Hab. Accra (Gold Coast), five specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

The form of the palpi of this species is somewhat peculiar; the second joint throws out a brush of hair-like scales on its upper side, with a few on its under side towards the apex; thus the joint itself passes through the brush, and gives off the apical joint at its apex, whereas in *Nothris* and *Ypsolophus* it is tufted beneath, and the apical joint is given off from the base of the tuft. The neuration agrees with that of *Ypsolophus*, but the excavated costal margin distinguishes it in appearance, and the peculiar palpi seem to justify its reception in the genus *Anorthosia*, Clem., which also possesses a slight depression on the costal margin.

Anarsia, *Z.*

[Pl. v., fig. 48.]

Anarsia agricola, sp. n.

Antennæ annulated with hoary and fuscous. *Palpi* with a long triangular tuft projecting beneath the second joint; fuscous on the basal half, hoary beyond, each section clearly defined; apical joint smooth, hoary, a ring near the base, and the whole outer half above fuscous, a pale spot on the outer half beneath. *Head and Thorax* hoary. *Fore wings* hoary; with a large triangular fuscous dorsal patch, sprinkled with hoary scales, extending beyond the middle of the dorsal margin, obtusely terminated below the costa; above its apex is a small, and beyond it a larger elongate costal spot of the same colour, both tending obliquely outwards; the

whole apical portion of the wing, above the anal angle and parallel with the apical margin, is shaded with fuscous scales and patches; cilia greyish fuscous. *Hind wings* semitransparent, shining iron-grey, with a slight lilac iridescence; cilia pale cinereous. *Abdomen* pale cinereous. *Legs* pale cinereous, the posterior tarsi shaded with fuscous, faintly pale spotted. *Exp. al.* 11 mm.

Hab. Estcourt (Natal), two specimens (*Hutchinson*).

Type, ♀, Mus. Wlsm.

One of these specimens is a rather dark variety.

I have a third variety much paler than the type, with less suffusion of dark scaling, and the dorsal patch more conspicuously contrasted with the pale ground colour, but it cannot be regarded as a separate species.

Exp. al. 12 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

[Pl. v., fig. 49.]

Anarsia inculta, sp. n.

Antennæ annulated with hoary and greyish fuscous. *Palpi* with a large square tuft, or flattened brush, of projecting scales beneath the second joint; hoary, speckled and shaded externally with greyish fuscous; apical joint whitish, with a broad black band of scales around its middle. *Thorax* hoary, tegulæ tinged with greyish fuscous. *Fore wings* hoary, obliquely tinged with greyish fuscous, and some brownish scales at the base, narrowly on the costal, more widely on the dorsal margin; a triangular tawny fuscous patch occupies the middle of the costal margin, its apex reaching to the dorsal margin; a chestnut-brown spot on the fold, intermixed with groups of raised blackish scales, forms its central portion; the apical part of the wing is also shaded with tawny fuscous scales; cilia tawny fuscous, sprinkled with hoary scales, and becoming paler about the anal angle. *Hind wings* semi-transparent iridescent tawny grey; cilia grey. *Abdomen* iridescent tawny grey; anal tuft ochreous. *Exp. al.* 12—14 mm.

Hab. Bathurst (Gambia), three specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

XYLORYCTINÆ.

IDE, *Chamb.*

[Pl. v., fig. 50.]

Ide complanella, sp. n.

Antennæ ciliated in the ♂; grey. *Palpi* stone-grey, inclining to ochreous towards their apex. *Head and Thorax* greyish stone-colour. *Fore wings* greyish stone-colour, tinged with ochreous along the costal margin throughout their length; cilia shining silvery. *Neuration* 12 veins; all separate; 1*b* furcate at base. *Hind wings* stone-grey, with pale shining cilia. *Neuration* 8 veins; 6 and 7 from a common stem; 3 and 4 from a point; 1*b* furcate at base; 8 joined to upper margin of cell near base by a cross-vein. *Abdomen* greyish stone-colour. *Legs* pale stone-colour. *Exp. al.* 15—16 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

This species agrees with the North American forms in colour and structure, but the cilia are paler and the wings somewhat narrower, and even more like those of *Lithosia* than in others of this Lithosiform genus.

Ide lithosina, Z. (the type of the genus), from the United States, is figured on Pl. VII., fig. 85.

DEPRESSARIANÆ.

DEPRESSARIA, *Hw.*

[Pl. v., fig. 51.]

Depressaria inornatella, sp. n.

Antennæ cinereous, tinged with fuscous towards the base. *Palpi* pale cinereous, sprinkled with fuscous scales externally, and with an ill-defined fuscous band of scales before the apex of the second joint, and a smaller one near the base of the apical joint. *Head* cinereous; face shining whitish. *Thorax* tawny fuscous. *Fore wings* cinereous, much spotted, sprinkled, and suffused with tawny fuscous, without the indication of any characteristic pattern or marking, except a small patch of dark tawny fuscous scales at the extreme base of the dorsal margin, and a dark tawny fuscous elongate oblique spot lying above and beyond the outer and upper angle of the cell, but not reaching to the costal margin; preceding and following this are two obscure costal spots of the same colour, and a smaller one lies obliquely between the preceding costal spot and the base of the elongate spot first mentioned; these, as well as a few other small costal and marginal spots, are very indistinct;

there is also a faint indication of the usual dark spot on the end of the cell; cilia pale cinereous. *Hind wings* pale cinereous; cilia the same, with a faint paler line along their base. *Abdomen* tawny fuscous. *Exp. al.* 17 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♀, Mus. Wlsm.

This species belongs to Section B of the genus, characterised by having veins 2 and 3 of the fore wings from a common stem.

ŒCOPHORINÆ.

CRYPTOLECHIA, *Z.*

[Pl. vii., fig. 86.]

Cryptolechia straminella, Z.

Caffraria, two specimens (*Boheman, Zell. Coll.*); Zululand, two specimens (*the late Col. Harvey Tower*); Cape Colony, one specimen (*Trimen*).

CACOCHROA, *Hein.*

N. syn.= *TERATOPSIS*, Wlsm., Trans. Ent. Soc Lond., 1881, 259—60.

The genus which I described as *Teratopsis* must sink as a synonym of *Cacochroa*, since it is identical in structure and neuration.

Cacochroa tunicella, Wlsm.

Teratopsis tunicella, Wlsm., Trans. Ent. Soc. Lond., 1881, 260.

Annshaw (Cape Colony), one specimen (*Barrett*).

ANCHINIA, *Hb.*

Anchinia drucella, Wlsm.

Topeutis drucella, Wlsm., Trans. Ent. Soc. Lond., 1881, 268—9.

Malvern (Natal), one specimen (*Bowker*).

I am induced to transfer this species to the genus *Anchinia*, on the ground of the form of the labial palpi, the neuration also agreeing with that of the type.

PHILOBOTA, *Meyr.*

[Pl. v., fig. 52.]

Philobota virgo, sp. n.

Antennæ with a distinct pecten on basal joint; strongly pubescent; white. *Palpi* very long and slender, recurved; white, with a slight greyish tinge. *Head* white, with a slight greyish tinge. *Thorax* white, slightly tinged with grey anteriorly. *Fore wings* with rather straight costa, rounded apex, and oblique apical margin; pure shining white, cilia shining white. Under side grey, cilia white. *Hind wings* whitish grey, with an indistinct greyish line along the base of the white cilia. Under side the same colour as on the upper side, but with no line along the cilia. *Abdomen* grey. *Legs:* the anterior pair with the femora and tibiæ shaded with fuscous, the others white. *Exp. al.* 29 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

This species differs from *Crytolechia straminella*, Z., in possessing a distinct pecten on the basal joint of the antennæ, and consequently falls into *Philobota*, Meyr.

PSECADIA, *Hb.*

Psecadia sabiella, F. & R.

Psecadia? sabiella, F. & R., Reise Nov. Lp., Pl. CXXXIX., 30 (1875).

Œcophora? sabiella, Wlsm., Trans. Ent. Soc. Lond., 1881, 270—1.

Grahamstown (Cape Colony), one specimen (*Druce*); Estcourt (Natal), one specimen (*Hutchinson*); Delagoa Bay (East Africa), two specimens (*Druce*).

Psecadia circumdatella, Wkr.

Grahamstown (Cape Colony), one specimen (*Druce*).

Psecadia livida, Z.

Delagoa Bay (East Africa), one specimen (*Druce*); Accra (Gold Coast), one specimen (*Carter*).

In my previous paper (Trans. Ent. Soc. Lond., 1881, p. 249), through the printer having omitted to space this species from the preceding, it would appear that I regarded this as a synonym of *circumdatella*. This printer's error is unfortunate, as they are abundantly distinct.

Psecadia oculigera, Mschl., Ver. Z.-b. Ges. Wien., XXXIII., 309, Pl. XVI., 25. (1883).

Caffraria; Grahamstown (Cape Colony), one specimen (*Druce*); Accra (Gold Coast), two specimens (*Carter*).

CNEMIDOLOPHUS, *Wlsm.*

Cnemidolophus lavernellus, Wlsm.

Bathurst (Gambia), one specimen (*Carter*).

GLYPHIPTERYGINÆ.

GLYPHIPTERYX, *Hb.*

[Pl. v., fig. 53.]

Glyphipteryx grapholithoides, sp. n.

Antennæ fuscous. *Palpi and Haustellum* pale ochreous. *Head* smooth; bronzy fuscous. *Thorax* bronzy fuscous. *Fore wings* bronzy fuscous, with a conspicuous whitish ochreous transverse fascia at one-fourth of the wing-length, outwardly angulated in the middle, and attenuated towards the costal and dorsal margins; beyond it are seven slender costal streaks, the first five or six outwardly oblique, all are pale ochreous at their costal extremity, the second, fourth, fifth, and sixth with steel-grey metallic terminations; a coppery metallic upright streak above the anal angle indicates the position of what in the genus *Grapholitha* would be the ocelloid patch; above and beyond the upper end of this is a small coppery metallic spot, opposite to the slight subapical indentation of the outer margin; rather beyond the middle of the dorsal margin is a group of small whitish ochreous spots and scales, reaching as far as the lower extremities of the costal streaklets; cilia whitish, tipped with brown. Under side pale bronzy brownish, with four pale ochreous costal spots before the apex. *Hind wings* brownish fuscous, with scarcely paler cilia. Under side pale bronzy brownish, slightly paler than in the fore wings, with a pale ochreous costal spot, rather larger than those in the fore wings, immediately before the apex. *Abdomen* bronzy fuscous. *Legs* bronzy fuscous; the posterior pair with whitish ochreous spurs and three pale spots on the tarsal joints. *Exp. al.* 10 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

This species approaches those of the South American genus *Ussara*, Wkr., in appearance, but I am unable to distinguish it from *Glyphipteryx*. It is very nearly

allied to *Gelechia gemmatella*, Wkr., from Sierra Leone [Cat. Lp. Ins. B. M., XXX., 1022. (1864)], but Walker's species has the pale basal band much wider, especially on the dorsal margin; it has also distinct whitish streaks on the sides of the abdomen, and a larger proportion of yellow streaks and spots on the costal and median portions of the wing. It is possible that an extended series of specimens might connect these two forms as varieties of one species.

LAVERNINÆ.

LAVERNA, *Crt.*

[Pl. v., fig. 54.]

Laverna gambiella, sp. n.

Antennæ annulated with whitish ochreous and brownish fuscous. *Palpi* whitish ochreous, touched with brownish on the outer side of the second joint, at the base and near the apex; apical joint two-thirds as long as the second, biannulated with fuscous. *Head and face* whitish ochreous. *Thorax* umber-brown. *Fore wings* pale whitish ochreous; with a distinct outwardly oblique basal patch, wider on the dorsal than on the costal margin, shaded with grey except on its outer third, where it is rich umber-brown; about the middle of the wing is a broad transverse band, of which the middle portion is pale tinged with greyish, the margins being clothed with rich umber-brown scaling, the inner margin outwardly oblique from the costa, the dark scaling rather scattered and diffused, the outer margin strongly angulated inwards at the middle, and with much thicker and closer dark scaling, which extends around the anal angle to the apex, leaving a quadrangular cream-white costal patch above it, extending inwards to one-third from the apex; cilia dark brownish grey. *Hind wings* pale greyish near the base, tinged with brownish beyond; cilia pale brownish grey. *Abdomen* subochreous. *Legs* whitish ochreous, barred and spotted with umber-brown. *Exp. al.* 10—12 mm.

Hab. Bathurst (Gambia), five specimens taken among mallow in November and December (*Carter*); Gambia, nine specimens (*Druce*).

Type, ♂ ♀, Mus. Wlsm.

[Pl. vi., fig. 55.]

Laverna quinquecristata, sp. n.

Antennæ, basal joint somewhat enlarged; brown, spotted with ochreous towards their outer ends. *Palpi* very long, overarching the vertex, apical joint as long as the second; pale ochreous, barred

with brown at the base and near the apex of the second joint, and above the base and before the apex of the apical joint. *Head* smooth; pale ochreous. *Thorax* blackish, with two longitudinal ochreous lines, one each side of the middle. *Fore wings* narrow, tapering outwards from near the base, the costa slightly convex before the middle; coloured with an almost equal admixture of pale ochreous and brown scales; with five distinct raised pale ochreous, smooth, shining tufts, two near the costal and three near the dorsal margin; the outer of the three dorsal tufts is scarcely beyond the half of the wing-length, and the two costal tufts are opposite the spaces between the dorsal ones; there is a slight indication of a few raised scales beyond the third dorsal tuft, but in the specimen before me these do not form a tuft; cilia pale brownish fuscous. *Hind wings* grey; cilia pale brownish fuscous. *Abdomen* brown. *Legs* brown, spotted with pale ochreous. *Exp. al.* 22 mm.

Hab. Estcourt ((Natal), one specimen (*Hutchinson*).

Type, ♀, Mus. Wlsm.

STAGMATOPHORA, *H.-S.*

[Pl. vi., fig. 56.]

Stagmatophora fasciata, sp. n.

Antennæ fuscous, annulated with white, and with white longitudinal streaks on the fuscous basal joint. *Palpi* cream-white, the apical joint dusted with fuscous. *Head* yellow; face white. *Thorax* purplish fuscous. *Fore wings* cream-white, with a basal patch, a broad central fascia and the apex all purplish fuscous, the edges of these markings being tolerably straight, except the inner edge of the central fascia, which is curved outwards, and the inner edge of the apical shade, which extends inwards somewhat along the dorsal margin; cilia pale purplish fuscous, paler at the anal angle. *Hind wings* pale grey; cilia pale purplish. *Abdomen* greyish fuscous. *Legs* cream white, broadly barred with purplish fuscous. *Exp. al.* 9 mm.

Hab. Bathurst (Gambia), four specimens taken from November to December, attached to a species of mallow (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

[Pl. vi., fig. 57.]

Stagmatophora distincta, sp. n.

Antennæ with the elongate basal joint white, a distinct brown spot above beyond its middle, thence entirely white beneath, above alternately spotted and banded to the middle, and banded beyond the middle with brown, the apical joints brown. *Palpi* very slender, recurved, divergent; white touched with brown, especially at the ends of the second and apical joints. *Head* white. *Thorax* stout, brown, fringed with whitish hairs posteriorly. *Fore wings* brown, with a broad, slightly oblique, shining white fascia near the base; two shining white lunate spots beyond the middle, one costal, the other dorsal and slightly further removed from the base; a third larger lunate costo-apical spot reaching to the apical cilia; cilia greyish brown. *Hind wings* shining grey at the base, merging into brown beyond it; cilia brownish grey. *Abdomen* white, with two brown spots at the base; the first large, the other small; a row of three large brown spots along each side, and two brown bands across the two penultimate segments; anal tuft whitish. *Legs* white, banded with brown. *Exp. al.* 11 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

The only respect in which this species differs from the typical forms of this genus is in its somewhat wider wings (both fore and hind wings), of which, however, the general pattern of neuration appears to be the same.

Pyroderces, *Z.*

[Pl. vi., fig. 58.]

Pyroderces simplex, sp. n.

Antennæ whitish fawn-colour, spotted with brownish fuscous above. *Palpi* divergent, recurved, slender; pale fawn-colour, apical joint slightly longer than the second, touched with fuscous above the middle and before its apex. *Haustellum* long, clothed with shining white scales throughout. *Head* fawn-colour; face slightly paler. *Thorax* fawn-colour, paler posteriorly; with a shining metallic iridescence on the under side. *Fore wings* fawn-colour, with a slender outwardly curved transverse whitish streak at one-fourth from the base, preceded by some fuscous scales, which tend to form a basal patch; some shining whitish scales with a lilac iridescence are continued from its lower end, along the dorsal margin to the base, and extend also outwardly along the dorsal margin; on the dorsal margin at about half the wing-length is a

small, outwardly oblique, spot of fuscous scales; at the extreme apex is a dark fuscous spot preceded by a few scattered paler fuscous scales, which are also to be found along the base of the cilia; cilia fawn-colour, inclining to greyish fawn about the anal angle. *Hind wings* grey, with fawn-grey cilia. *Abdomen* cinereous. *Legs* pale fawn, inconspicuously banded with darker fawn. *Exp. al.* 9—11 mm.

Hab. Bathurst (Gambia); two specimens, one bred from a mine in a species of mallow in November, the other taken on the wing in the same month (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

STATHMOPODA, *Stn.*

[Pl. vi., fig. 59.]

Stathmopoda maculata, sp. n.

Antennæ pale fawn. *Palpi* whitish, apical joint slightly tinged with fawn above. *Head* pale fawn above; face whitish. *Thorax* stout; cream-white, except on its extreme anterior margin, which is fawn-colour. *Fore wings* creamy-white, the costal margin narrowly shaded throughout with fawn-brown; a triangular fawn-brown basal patch, of which the apex reaches the dorsal margin; a transverse fascia in the middle, wider on the costal than on the dorsal margin, and a transverse shade occupying the whole apical fourth of the wing (except the extreme apex, which is slightly paler), of which the inner edge is outwardly oblique from the costa to the dorsal margin; all deep fawn-brown, with a very slight purplish hue; cilia pale brownish ochreous. *Hind wings* pale fawn-grey, with pale brownish ochreous cilia. *Abdomen* fawn-brown. *Legs* pale fawn-colour, with deep fawn-brown tufts and tarsal spots. *Exp. al.* 18—20 mm.

Hab. Gambia, two specimens (*Druce*).

Type, ♂ ♀, Mus. Wlsm.

This species has a very distinct appearance despite the general similarity of colouring in *S. crassella*. The thorax is also equally stout, but the ground colour of the fore wings is much paler, and so distinctly mapped out into two elongate patches, enclosed on three sides by the dark fawn-brown transverse shades, as to destroy the somewhat suffused effect. It is also larger, and the subapical shade does not point inwards but outwards from the costa. Both *crassella* and *maculata* approach *Stath-*

mopoda pedella, L., but they are much more robust, owing to their wider thorax.

[Pl. vi., fig. 60.]

Stathmopoda crassella, sp. n.

Antennæ strongly ciliated on their inner side; pale fawn. *Palpi* very slender, divergent, recurved; second joint whitish, apical joint fawn-colour. *Haustellum* white. *Head* pale fawn above; face shining white. *Thorax* very stout; fawn-colour; shining white beneath. *Fore wings* fawn-colour, with the extreme costal margin very narrowly tinged with purplish fuscous; a transverse streak very near the base; an oblique transverse shade before the middle, tending outwards towards the dorsal margin, and an oblique transverse shade, at one-fourth from the apex, tending inwards towards the dorsal margin; all purplish fuscous; cilia pale brownish ochreous. *Hind wings* pale fawn-grey, with pale brownish ochreous cilia. *Abdomen* pale fawn-grey; shining white beneath. *Legs* pale fawn, with purplish fuscous tufts at the joints and spurs; shining white beneath. *Exp. al.* 11—14 mm.

Hab. Bathurst (Gambia), five specimens taken at light in November and December (*Carter*); Gambia, five specimens (*Druce*).

Type, ♂ ♀, Mus. Wlsm.

[Pl. vi., fig. 61.]

Stathmopoda divisa, sp. n.

Antennæ pale greyish brown. *Palpi* whitish, tinged with greyish brown on the upper side of the apical joint. *Head* dark greyish brown above; face white. *Thorax* stout; yellow. *Fore wings* yellow to more than one-third of their length; with two small greyish brown costal spots, one at the extreme base very small, the second small, immediately beyond it near the base; a greyish brown shade with straight inner margin occupies the whole outer portion of the wing from before the middle, the yellow ground colour showing only in small ill-defined longitudinal streaks or spots beyond the middle; cilia pale greyish brown. *Hind wings and cilia* pale greyish brown. *Abdomen* greyish brown. *Legs* very pale greyish brown. *Exp. al.* 10 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

This species has much the pattern and colouring of a *Lozostoma*, but it is apparently a true *Stathmopoda*; it

is closely allied to *Gelechia auriferella*, Wkr., from Sierra Leone [Cat. Lp. Ins. B. M., XXX., 1022. (1864)], which differs from it only in having a pale yellow band extending across the wing beyond the middle. The colouring is much the same in both species, although the darker shades are described by Walker as "cupreous," which, perhaps, fairly describes what I have called "greyish brown."

BUTALINÆ.

BUTALIS, *Tr.*

Butalis chloræma, Meyr., Trans. Ent. Soc. Lond., 1887, 279.

Grahamstown (Cape Colony).

[Pl. vi., fig. 62.]

Butalis subeburnea, sp. n.

Antennæ dirty cream-colour at the base, shading to brownish beyond. *Palpi* dirty cream-colour, slightly shaded with brownish grey. *Head* dirty cream-colour. *Thorax* dull cream-colour. *Fore wings* dirty cream-colour, faintly shaded along the costal and dorsal portions, the central part of the wing throughout its length inclining to ivory-white; cilia the same colour as the wings, with a faint brownish tinge about the anal angle. *Hind wings* shining leaden grey; cilia very pale brownish cream-colour. *Abdomen* grey, the anal segments creamy. *Legs* pale. *Exp. al.* 15—17 mm.

Hab. Bathurst (Gambia), two specimens taken at light in November (*Carter*); Gambia, one specimen (*Druce*).

Type, ♀, Mus. Wlsm.

BLASTOBASIS, Z.

[Pl. vi., fig. 63.]

Blastobasis irroratella, sp. n.

Antennæ pale greyish brown; the basal joint fringed below and of the same colour as the face. *Palpi*, apical joint one-third the length of the second, greyish brown; second joint greyish brown, with the apex hoary. *Head and face* hoary, profusely sprinkled with greyish brown scales. *Thorax and tegulæ* hoary, profusely sprinkled with greyish brown. *Fore wings* hoary whitish, profusely sprinkled with greyish brown scales, which are indistinctly grouped in an outwardly oblique dorsal streak before the middle, an elongate

spot on the middle of the disc, and a rounder spot beyond the end of the cell; cilia hoary, very sparsely sprinkled with pale greyish brown. *Hind wings* pale brownish grey; cilia pale cinereous. *Abdomen and legs* pale cinereous. *Exp. al.* 13 mm.

Hab. Bathurst (Gambia), one specimen, November (*Carter*).

Type, ♂, Mus. Wlsm.

ŒDEMATOPODA, Z.

Œdematopoda princeps, Z.

Delagoa Bay (East Africa), two specimens (*Druce*).

ERETMOCERA, Z.

Eretmocera fuscipennis, Z.

Bathurst (Gambia), two specimens (*Carter*).

Eretmocera carteri, Wlsm., Trans. Ent. Soc. Lond., 1889, 28, Pl. VI., 11.

Bathurst (Gambia), three specimens (*Carter*).

Eretmocera derogatella, Wkr.

Zanzibar (East Africa), two specimens (*Jackson*).

Eretmocera dorsistrigata, Wlsm., Trans. Ent. Soc. Lond., 1889, 29, Pl. VI., 13.

Zanzibar (East Africa), two specimens (*Jackson*).

Eretmocera miniata, Wlsm., Trans. Ent. Soc. Lond., 1889, 30—1, Pl. VI., 15.

Zanzibar (East Africa), two specimens (*Jackson*).

Eretmocera scatospila, Z.

Bathurst (Gambia), seventeen specimens, August (*Carter*); Accra (Gold Coast), one specimen (*Carter*).

Eretmocera basistrigata, Wlsm., Trans. Ent. Soc. Lond., 1889, 32—3, Pl. V.

Bathurst (Gambia), two specimens (*Carter*).

Eretmocera lætissima, Z.

Caffraria, two specimens (*Boheman*, *Zell. Coll.*) ; Bathurst (Gambia), seventeen specimens, October—November (*Carter*).

COSMOPTERYGINÆ.

Cosmopteryx, *Hb.*

[Pl. vi., fig. 64.]

Cosmopteryx cognita, sp. n.

Antennæ bronzy brown, the elongate basal joint paler beneath, the five apical joints are white, the next four or five dark bronzy, preceded by a wide, once interrupted, white band. *Palpi* bronzy. *Head* bronzy; face metallic steel-grey. *Thorax* bronzy. *Fore wings* bronzy brown, with a slightly oblique brassy metallic band at half their length, preceding the usual orange fascia; half-way between this band and the base are three silvery streaklets, the upper one oblique from the costa, the middle one above the fold, very short, commencing opposite the apex of the upper one, and reaching about half the length of the lower one, which is stouter and lying below the fold, it commences opposite the base of the middle one and projects beyond it; the orange fascia is margined externally by a very oblique brassy metallic band running inwards from the costal to the dorsal margin, and is separated from it, as from the similar band which precedes it, by a few blackish scales; there is a conspicuous white streak in the costal cilia at the upper end of the outer metallic band and the apical portion of the wing, which is bronzy brown, contains a single small brassy spot at the apex, and a tiny white streak at the extreme end of the apical cilia; cilia bronzy brown. Under side æneous, the costal and terminal white streaks alone visible. *Hind wings and cilia* pale greyish brown. Under side æneous. *Abdomen* brown. *Legs:* posterior tibiæ and tarsi bronzy brown, banded and spotted with white. *Exp. al.* 12 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

The only species of *Cosmopteryx* hitherto recorded from South Africa is an undescribed species noticed by Stainton (Ent. Week. Int., IX., 32 (1860)).

BATRACHEDRINÆ.

ZARATHRA, *Wkr.*

[Pl. vi., fig. 65.]

Zarathra muricicoma, sp. n.

Antennæ considerably longer than the fore wings; steel-grey; basal joint slightly enlarged, orange ochreous. *Labial palpi* long, slender, divergent, recurved; apical joint longer than second, both smooth; shining ochreous. *Maxillary palpi* short, distinct, white. *Haustellum* rather long. [Walker writes of *Zarathra* "proboscis nulla," but his specimens of *Zarathra pterodactyla* have long tongues.] *Head* posteriorly shining metallic steel-white, above and in front brilliant purple. *Thorax* brownish purple. *Fore wings* very narrow, elongate, brownish purple; with a slender shining steel-white streak along the costal margin before the costal cilia; another almost parallel below it; a conspicuous white spot near the base of the dorsal margin, above which the costal portion of the wing is bright purple; another conspicuous semicircular white spot on the middle of the dorsal margin, above which is a nearly obsolete small whitish costal spot; dorsal cilia with a greenish iridescent hue. *Hind wings* elongate, very narrow, sharply pointed, purplish grey; cilia very long, purplish brown, in some lights with a greenish hue. *Abdomen* shining, iridescent, purplish grey above, with white patches at the sides and beneath, anal segment white. *Legs* [missing.] *Exp. al.* 11½ mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂, Mus. Wlsm.

GRACILARIANÆ.

GRACILARIA, *Hw.*

[Pl. vi., fig. 66.]

Gracilaria punctulata, sp. n.

Antennæ white beneath, distinctly spotted with brown above. *Palpi* whitish at the base and apex, shaded with umber-brown at the sides and around the middle. *Head* white, with a shining umber-brown bar across the front. *Thorax* whitish. *Fore wings* bone-white, delicately shaded with pale reddish brown along the middle, on and above the fold, this colour becoming more intense about the apex of the wing; on the extreme costa near the base are three or four minute brownish dots; a dark brown spot on the disc, about the middle of the wing, is followed by another nearer to the costal cilia; there is an indication of a third similar spot in

the darker portion of the wing; there are also a few brown scales on the middle of the fold; cilia bone-white, tinged with reddish brown. *Hind wings* grey; cilia very pale reddish brown. *Legs* white, tinged with brown, apparently unspotted. *Exp. al.* 8 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♀, Mus. Wlsm.

[Pl. vi., fig. 67.]

Gracilaria apicistrigata, sp. n.

Antennæ longer than the fore wings; white. *Labial palpi* drooping, divergent, longer than the head; white. *Maxillary palpi* conspicuously projected; white, tipped with brown. *Head* shining white; face very oblique, shining white. *Thorax* shining white; tegulæ brown. *Fore wings* shining white along the dorsal third, brown on the costal two-thirds; the edge of the white dorsal band clearly defined, throwing two obtusely angulated projections into the brown space above it, one before, the other about the anal angle, between which the brown colour nearly reaches the dorsal margin; a blackish elongate dash below the costa, before the apex, contains two or three detached white scales; and at the extreme apex in the middle of the apical cilia an upright short black streak is preceded by a whitish costal spot; cilia at the apex greyish, below it shining white, at and before the anal angle greyish. *Hind wings and cilia* pale brownish grey. *Abdomen* grey. *Legs* greyish, spotted with white on the posterior tarsal joints. *Exp. al.* 7 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

[Pl. vi., fig. 68.]

Gracilaria bifasciata, sp. n.

Antennæ pale brown, the basal joint white. *Palpi* white. *Head and face* white. *Thorax* whitish, slightly tinged with pale brownish anteriorly. *Fore wings* pale brown, with two broad white fasciæ, the one before, the other immediately beyond the middle, both dilated to the dorsal margin, the first evenly, the second on the outer side only; beyond the second fascia is a conspicuous triangular white costal spot, preceded by a much smaller one, and followed by the white apical cilia, in which are two brownish fuscous streaklets, one at the base and one in the middle, meeting towards the anal angle, and giving a caudate appearance to the

wing; all the white markings are delicately margined before and behind with lines of brownish fuscous scales; cilia at the anal angle pale greyish fuscous. *Hind wings* pale greyish fuscous; cilia the same. *Abdomen* greyish brown. *Legs* white, banded and spotted with brownish fuscous; tarsal spurs white, with a brownish fuscous spot on each. *Exp. al.* 7 mm.

Hab. Bathurst (Gambia); one specimen bred from mines in a species of mallow, November (*Carter*).

Type, ♂, Mus. Wlsm.

This species belongs to the *scalariella* group.

LYONETIANÆ.

MICROTHAUMA, gen. n.

(μικρός = little, θαῦμα = marvel.)

Type. *Microthauma metallifera*, Wlsm.

[Pl. vii., fig. 87.]

Antennæ with basal joint enlarged and clothed with a conspicuous eye-cap. *Labial palpi* drooping. *Maxillary palpi* obsolete. *Haustellum* present. *Head* tufted; face smooth. *Fore wings* moderately broad, acuminate. *Neuration* 8 veins; 1 forked at base; 2 from near angle of cell; 4 from the cross-vein closing cell; 5 and 6 from a common stem; 7 from beyond middle of cell to costa; 8 to costa before middle. *Hind wings* narrow, elongate, acuminate, tapering from base outwards. *Neuration* 4 veins; 3 and 4 from subcostal vein, 4 to apex; cell open.

This genus differs from *Opostega* in neuration, as well as in the more developed drooping labial palpi.

[Pl. vi., fig. 69.]

Microthauma metallifera, sp. n.

Antennæ and eye-caps white. *Palpi* short, depressed; whitish. *Head* white, tufted above; face smooth. *Thorax* white. *Fore wings* shining white; a small indistinct spot of bronzy scales, mixed with golden yellow, on the costa before the middle, has an outwardly oblique inner margin pointing towards the apex of an also outwardly oblique bronzy metallic dorsal streak slightly beyond it, which is connected with a bright patch of golden yellow metallic scales, blending into bronzy brown at their outer and lower extremity; this patch occupies about the middle of the dorsal margin; before it, much nearer to the base, is a smaller spot of dark bronzy brown metallic scales; on the costa beyond

the middle are two very slender oblique and rather indistinct brownish lines pointing towards a bright golden metallic spot on the middle of the outer margin below the apex; above this outer spot is a slender very oblique brownish streak in the costal cilia, depressed at the apex, and giving the wing a distinctly caudate appearance; cilia white, tipped with brownish above the apical streak. *Hind wings* shining white; cilia white. *Abdomen* shining white. *Legs* white; the posterior tarsal joints faintly spotted with brownish. *Exp. al.* 7 mm.

Hab. Estcourt (Natal), one specimen (*Hutchinson*).

Type, ♂, Mus. Wlsm.

NEPTICULINÆ.

LICMOCERA, gen. n.

(λικμός = a winnowing fan, κέρας = a horn.)

Type. *Licmocera lyonetiella*, Wlsm.

[Pl. vii., fig. 88.]

Antennæ as long as the fore wings, simple; the basal joint much developed and clothed with a wide eye-cap. *Ocelli* obsolete. *Maxillary palpi* distinct, small, drooping. *Labial palpi* strongly divergent, slender, recurved, acuminate, evenly clothed throughout with smooth scales; apical joint slightly exceeding the second joint in length. *Haustellum* rather short, naked. *Head and face* smooth. *Fore wings* narrow, elongate, gently tapering to an acute apex, which is not depressed. *Neuration* 10 veins; 6 and 7 from a common stem, 6 to apex; 3 and 4 approximate at their bases; 1 simple at its base. *Hind wings* elongate, acuminate, evenly attenuated from base, dorsal margin slightly convex, cilia very long. *Neuration* 6 veins; 3 and 4 from a point, as are also 5 and 6; cell closed; 2 from before outer third of cell. *Abdomen* slender, two-thirds the length of the fore wings. *Legs* slender, posterior tibiæ clothed above with short hair-like scales.

[Pl. vi., fig. 70.]

Licmocera lyonetiella, sp. n.

Antennæ whitish, tinged with ochreous; with the basal joint widened into an eye-cap, shining white. *Labial palpi* slender, diverging, long and recurved, white. *Maxillary palpi* meeting over the short tongue; white. *Head and face* lustrous white. *Thorax* white. *Fore wings* narrow, elongate, acute, white; with a group of scattered scales before the middle, two dorsal and one

costal spot fawn-brown, also a few fawn-brown scales near the base of the dorsal margin; the dorso-marginal spots are elongate, semi-ovate, the first immediately before the middle, the second at one-fourth from the apex, above and scarcely before this is the smaller oblique costal spot, rather darker in colour than the others; at the extreme apex is a round shining metallic silvery spot, preceded by two or three brownish scales in the base of the white costal cilia; cilia at the apex white, at the anal angle brownish grey. *Hind wings* elongate, evenly attenuated from the base, the dorsal margin slightly convex, together with the cilia pale brownish grey. *Abdomen* narrow, acute, pale, shining brassy yellowish above, whitish at the sides and beneath. *Legs* white. *Exp. al.* 11 mm.

Hab. Bathurst (Gambia), three specimens (*Carter*).

Type, ♂ ♀, Mus. Wlsm.

OXYMACHÆRIS, gen. n.

(ὀξύς = sharp, μάχαιρα = knife.)

Type, ♂. *Oxymachæris niveocervina*, Wlsm.

[Pl. vii., fig. 89.]

Antennæ simple, about two-thirds the length of the fore wings; basal joint somewhat enlarged. *Labial palpi* slender, drooping, the apical joint as long as the second. *Maxillary palpi* conspicuous, drooping. *Haustellum* moderate. *Ocelli* obsolete. *Fore wings* lanceolate, acute, the costal and dorsal margins about equally convex. *Neuration* 8 veins; 5 and 6 from a common stem, enclosing the apex; the rest separate; 1 simple. *Hind wings* lanceolate, acute, the costal and dorsal margins about equally convex. *Neuration* 5 veins; 1, 2 and 5 simple; 3 and 4 stalked. *Legs:* posterior tibiæ thinly hairy.

[Pl. vi., fig. 71.]

Oxymachæris niveocervina, sp. n.

Antennæ pale fawn-colour. *Palpi* pale fawn-colour. *Head and face* white. *Thorax* white at the sides, yellowish fawn above. *Fore wings* bright yellowish fawn, with a richer more brownish tinge above the anal angle; a snow-white triangular patch on the middle of the base does not quite reach the costal or dorsal margins; a broad snow-white fascia runs obliquely inwards from the middle of the costal to before the middle of the dorsal margin, its

inner edge scarcely sinuate, its outer edge slightly irregular, with a projection on the fold, between two brownish fawn spots, not detached from the bright fawn portion of the wing beyond it; the white fascia is also projected narrowly along the costal margin to the apex; the costal cilia tipped with fawn-yellow; the cilia on the apical margin wholly fawn-yellow. *Hind wings and cilia* very pale fawn. *Abdomen and legs* pale fawn. *Exp. al.* 12 mm.

Hab. Bathurst (Gambia), one specimen (*Carter*).

Type, ♂, Mus. Wlsm.

Oxymachæris? zulella, Wlsm.

Lithocolletis zulella, Wlsm.

I have no longer access to the type of this species, which is in the Cape Town Museum; but, from my recollection of the shape of the hind wings, and from the figure, I am inclined to believe that it belongs to *Oxymachæris* rather than to *Lithocolletis*.

MICROPOSTEGA, gen. n.

(μικρός = little; *Opostega* (nom. gen).

Type. *Micropostega æneofasciata*, Wlsm.

[Pl. vii., fig. 90.]

Antennæ as long as the fore wings, simple; basal joint enlarged and clothed with a well-developed eye-cap. *Maxillary palpi* short, drooping. *Labial palpi* also drooping, cylindrical. *Head* much flattened, with a strong radiating frontal crest; face smooth. *Fore wings* rather wide, somewhat dilated from the base outwards, the costal margin slightly indented before the apex, apex rounded, cilia long. *Neuration* 5 veins; discal cell open; 2 and 3 from a common stem, as also 3 and 4. *Hind wings* very narrow, elongate, acuminate, evenly attenuated throughout, cilia long. *Neuration* with vein 1 near the base, and a single median vein forked at the apex. *Abdomen* flattened. *Legs* strongly tufted above.

This genus differs from *Opostega* in neuration, as well as in the flattened and highly crested head, and in the somewhat less developed eye-cap.

[Pl. vi., fig. 72.]

Micropostega æneofasciata, sp. n.

Antennæ white; eye-caps shining snow-white. *Head* rough above, white; face smooth, shining, snow-white. *Thorax* white. *Fore wings* white; a broad shining metallic brassy fascia, wider

on the dorsal than on the costal margin, takes a slightly oblique direction outwards and upwards, its edges straight and clearly defined, the outer edge reaching the costa before the middle; beyond it is a very oblique shining brassy costal streaklet, ending in silvery metallic scales; beyond this again is a slender brownish fuscous streaklet in the costal cilia, running to the apex, whence it is slightly depressed and curved in the apical cilia, having below it at the apex a small brownish fuscous spot; a large shining silvery metallic spot lies at the anal angle; cilia white. *Hind wings* shining white; cilia white. *Abdomen* shining white. *Legs* white. *Exp. al.* 6 mm.

Hab. Bathurst (Gambia), two specimens (*Carter*).

Type, ♂, Mus. Wlsm.

CORRECTION.

Since the first part of this paper has gone to press, I find that I have overlooked two species described by Mr. P. C. T. Snellen:—

DICHELIA, *Gn.*

[Pl. iii., fig. 5.]

Dichelia albardana, Snell.

Tortrix (*Dichelia*) *albardana*, Snell., Tijd. v. Ent., XV., 108—9, Pl. VIII., 10. (1872).

Lower Guinea.

I have re-described this species as *Conchylis tricolor* (*ante*, pp. 69—70), having mistaken vein 3 of the fore wings for vein 2. It is not a *Conchylis*, and is probably rightly referred to the genus *Dichelia*, though the stalk to veins 7 and 8 of the fore wings is shorter than in the typical species. *Argyrotoxa viridis*, Wlsm., though resembling this species in appearance, has these veins separate, though somewhat approximate at their bases.

SERICORIS, *Tr.*

Sericoris improbana, Snell.

Grapholitha (*Sericoris*) *improbana*, Snell., Tijd. v. Ent., XV., 109—10, Pl. VIII., 11. (1872); XXV., 234. (1882).

Lower Guinea.

Explanation of Plates III., IV., V., VI. & VII.

PLATE III.
See Explanation facing Pl. III.

PLATE IV.
See Explanation facing Pl. IV.

PLATE V.
See Explanation facing Pl. V.

PLATE VI.
See Explanation facing Pl. VI.

PLATE VII.
See Explanation facing Pl. VII.

IV. *New species of moths from Southern India.* By Colonel Charles Swinhoe, F.L.S., F.Z.S., &c.

[Read November 5th, 1890.]

Plate VIII.

BOMBYCES.

SYNTOMIDÆ.

1. *Tascia gana*, n. sp. (Pl. VIII., fig. 12).

♂. Antennæ, head, eyes, thorax, and both wings, black; antennæ bipectinated, branches below the shaft short and thick; top of head thickly covered with glistening blue-green scales, a few also on the shaft of the antennæ, a thin crimson line behind the head, followed by two thin lines of blue-green scales, a few similar scales scattered thinly over the thorax and fore wings, thickest on the costal and outer portions. Fore wing fairly clothed, thinly clothed within the cell, and with a semidiaphanous suffused streak in the basal half of the interspace below the cell; a large white semidiaphanous spot at the end of the cell, like a half-moon, with the circle inwards and the ends rounded. Hind wings paler, dull black, semidiaphanous, darkest on the costal border; abdomen with a blackish brown band at the base, followed by a broader golden band, a blackish brown band, and a golden band with brown anal tip, the last three bands of equal width; a brilliant band of crimson hairs on each side of the abdomen, from the top of the first golden band to the tip. Under side dull pale blackish brown, pectus crimson, legs blackish brown. Body as above, but with the golden bands reddish. Expanse of wings, 1 in.

Ganjam, October, 1887 (*Hampson*).

Easily distinguishable from all other Indian species of this genus by its beautifully coloured and banded abdomen.

2. *Syntomis magna*, n. sp. (Pl. VIII., fig. 1).

♂. Above and below of a uniform deep black; shaft of the antennæ broadly pure white near the tips. Fore wing with three

bands of diaphanous spots; 1st subbasal, a single small spot; 2nd medial, composed of two spots divided by the median vein, the lower one the larger and rounded below; 3rd discal, composed of three longitudinal spots of equal size, with rounded ends. Hind wing with basal and discal hyaline bands of spots divided into three portions by the veins, the lowest much the smallest. Abdomen tinged with green, with basal and medial orange bands, the former only on the upper side, the latter encircling the abdomen. Expanse of wings, $1\frac{7}{10}$ in.

North Kanara, August, 1886 (*Wise*).

Allied to nothing I know of.

3. *Syntomis lydia*, n. sp. (Pl. VIII., fig. 7).

♂ ♀. Antennæ pectinated with very short hairs in the ♂, simple in the ♀; antennæ, head, and body blackish brown; tips of the antennæ in the female white. Abdomen with a basal ochreous band above. Wings nearly all hyaline. Fore wing with the base and the costal band limited by the subcostal vein, brown; veins and markings of same colour, a patch at end of cell, a thickening where the 1st median branch is emitted, a broadish apical patch, and another towards the hinder margin, connected by a marginal line. Hind wing with the costa brown, and with an apical patch. Below, body and legs brown; abdomen of the female yellowish towards the anal portion. Expanse of wings, ♂ $\frac{8}{10}$, ♀ $\frac{9}{10}$ in.

Nilgiri Hills, 3500 ft., October, 1887 (*Hampson*).

Allied to *S. aperiens*, Walker, which also occurs in the Nilgiris; is more hyaline, the bands smaller, and there is no connecting band between the patch at the end of the cell and the apical patch on fore wings.

4. *Syntomis mota*, n. sp. (Pl. VIII., fig. 2).

♀. Antennæ simple; antennæ, head, and body black, a white space on antennæ towards the tips, collar golden yellow, and two bands of same colour on abdomen, basal and post-medial (on the fifth segment). Wings mostly hyaline; veins and patches black, base black, costal line limited by subcostal vein, and also the hinder border black; median vein and first median branch thick, thickest where the branch is emitted; a bottle-shaped patch at the end of the cell, with its neck running half-way up the 2nd discocellular interspace; an apical patch and a very large patch, square on its inner side, near the hinder angle, connected with the bottle-

shaped patch by the thickened veins, and to the apical patch by the black cilia, fining down at the angle, and running into the black hinder margin. Hind wing with the outer half black, and with a thick costal black margin to the hyaline portion, which is divided into two by the prominent black median vein. Under side: body and legs black; thorax with two large golden yellow spots on each side; abdomen with the lower golden band only; hind legs with whitish on the tarsi. Expanse of wings, $1\frac{1}{2}$ in.

Nilgiri Hills, 3500 ft., August, 1887 (*Hampson*).

Allied to *S. libera*, Walker, from Burma, differs chiefly in having the hyaline portion of the hind wings divided into two portions only, whereas in *S. libera* it is divided into three; and it is a much larger insect.

LITHOSIIDÆ.

5. *Barsine chromatica*, n. sp.

♂ ♀. Antennæ, body, and fore wings chrome-yellow, eyes black, thorax with a black spot on each shoulder, and two central. Fore wing with a black basal spot on costa, a subbasal black spot in the wing, a blackish brown spot at the end of the cell, and a broad band of the same colour, pale and suffused, running throughout the wing, formed by two transverse outwardly curved bands, one before the middle and the other discal, joined in the centre, and with the outer band thinning out some thick streaks towards the outer margin. Hind wing pale chrome-yellow, semidiaphanous, apex with a pale brownish patch. Abdomen with thick brownish hairs covering the lower half; tips yellow. Under side as above, but paler and less distinct; legs chrome-yellow. Expanse of wings, $1\frac{2}{10}$—$1\frac{3}{10}$ in.

Nilgiri Hills (*Lindsay*).

Allied to *B. rubricosa*, Moore, which I have also from the same locality, is larger, yellower, and differs in the pattern, having a spot at end of cell and no central band.

6. *Bizone linatula*, n. sp.

♀. Antennæ reddish; head, body, and fore wings pure white; thorax with red bands in front, across the middle, and at the base; abdomen with the hinder half reddish. Fore wing with four transverse red bands, somewhat as in *B. subornata;* subbasal, ante-medial, post-medial, and submarginal quite close to the margin, and the hinder part touching it, but not quite reaching the

angle; 2nd band inclining inversely and almost straight, 3rd nearly upright and angled sharply inwards above, 2nd lined with black on its inner side, 3rd lined with black on its outer side; three blackish brown spots inside end of cell, one in the median vein, and the other in a line above it. Hind wing pale reddish, with the costal third pure white; cilia of both wings white. Under side white; wings with the markings showing through; legs white, tarsi banded with pale pinkish. Expanse of wings, $1\frac{4}{10}$ in.

Khandalla and Matheran, October, 1886.

Allied to *B. subornata*, Walker; differs chiefly in the straightness and position of its 2nd band, and in the black edges to its 2nd and 3rd bands. Mr. Elwes (P. Z. S., 1890, p. 396) incorrectly refers this insect to *B. subornata*, but the prominent black edges to the bands clearly separate it from that species, this being a particularly distinctive specific character in the genus. I have one male and three females of *B. subornata* from the Andaman Islands, the females of which are identical with Walker's type, which is also a female; the male has the costal fold on fore wings well-marked; like the female it has three spots between the 2nd and 3rd bands, the upper two being covered by the heavy fold, and it has red hind wings.

7. *Bizone peregrina.*

Bizone peregrina, Walker, ii., 551 (1854); Elwes, P. Z. S., 1890, p. 390, No. 2.

North Kanara, July, 1886; Ceylon.

Mr. Elwes is correct in his note at top of p. 391; the insect he refers to as *B. peregrina*, Walker, is *B. puella*, Drury, and *vice versâ*, and Mr. Moore, in his collection, has the two names transposed. *B. puella* is an insect never common, but found in many parts of India north and south; I have a pair from Solon, near Simla, taken by the late Captain Reed on sugar, and specimens from Bombay, Khandalla, Thanna, and Mahableshwur; and there are in my collection three males and one female of *B. peregrina* from Ceylon, received from Mr. Mackwood, and a male and female from North Kanara, received from Mr. Wise. The two species are very distinct; Walker's Ceylon specimen is considered as his type of *B. peregrina*, his description is, however, a mixture of several species. *B. peregrina*, according to the Ceylon

type, has a male with the red bands on fore wing nearly straight, as in the female, costal fold distinct, and on the hind wing, just below the middle of the costa, is a large patch of blackish brown scales; the male, however, of the female insect named by Drury as *puella* has, like the female, bands rather deeply elbowed inwards, the 2nd band in the middle and the 3rd band near the hinder margin, the costal fold is very slight, and there is no patch of scales on the hind wing. All the males of *peregrina* have their hind wings nearly pure white, with pinkish suffusion on the borders; and the two central red bands on fore wings of both species are edged with black in both sexes, the 2nd band inwardly and the 3rd band outwardly.

8. *Ræselia culaca*, n. sp. (Pl. VIII., fig. 9).

♂. Antennæ grey; top of head and collar and anal tuft of abdomen pure white; thorax and fore wings greyish white; abdomen dark grey. Fore wing with a black costal subbasal spot, and three thin transverse zigzag blackish bands; ante-medial, medial, and post-medial, the two latter nearly meeting on the hinder margin; an indistinct incomplete submarginal grey festoon; this and all the bands more or less outwardly margined with white; marginal line grey. Hind wing whitish, faintly clouded with grey. Under side almost uniformly dark grey. Expanse of wings, $\frac{7}{10}$ in.

Nilgiri Hills (*Hampson*).

Allied to *R.* (*Nola*) *cingalesa*, Moore, from Ceylon, but can easily be distinguished by the difference in the bands on fore wings.

ARCTIIDÆ.

9. *Alpenus eximia*, n. sp. (Pl. VIII., fig. 8).

Antennæ and tip of palpi blackish; head, body, and fore wings bright ochreous red, hind wings paler, markings pale black, body unmarked. Fore wings with two or three short longitudinal streaks at the base, followed by a subbasal narrow band, slightly outcurved, and running on to the base along the costa, a medial broad band which bifurcates on to the costa, the outer branch angled outwardly close to a submarginal band of elongated spots. Hind wing with a spot at upper end of cell, and submarginal spots, which become minute in the middle, and are largest and suffused into a patch near the anal angle; the bands in the fore wing are more or less composed of longitudinal spots and streaks suffused

together. Under side: body, legs, and wings same colour as the hind wings above; body and legs without markings; wings marked as above. Expanse of wings, $1\frac{1}{10}$ in.

North Kanara, September, 1887 (*Wise*).

Its peculiar red colour at once distinguishes it from all other species of Indian *alpenus*.

LIPARIDÆ.

10. *Artaxa pelona*, n. sp.

♂. Antennæ, body, hind wings, legs, and whole surface below, pale straw-colour. Fore wings above bright cinnamon-yellow; three brown submarginal spots, 1st at apex, 2nd a little below it, and the 3rd near the hinder angle, and two transverse bands of blackish brown irrorations, ante-medial and post-medial, 1st slightly curved outwardly, 2nd recurved, throwing out a short band from its middle towards the outer margin; one specimen has nearly all the markings obsolete. Under side without any markings. Expanse of wings, $1\frac{2}{10}$ in.

Nilgiri Hills (*Lindsay*).

Allied to *A. fraterna*, Moore, from Ceylon, but is much larger and quite differently marked on the fore wings.

11. *Artaxa rhoda*, n. sp.

♂. Antennæ, body, and wings of a rich warm chrome-yellow. Hind wings slightly paler than the fore wings. Fore wing with a brown spot at the end of the cell; a straight macular band of brown irrorations from the centre of the hinder margin, towards the apex, which it does not reach; a short straight similarly composed thin band close inside, not macular, running from the basal third towards the spot at the end of the cell. Under side: body, wings, and legs of a uniform pale bright chrome-yellow, unmarked. Expanse of wings $1\frac{3}{10}$ in.

North Kanara, August, 1887 (*Wise*).

Allied to *A. discinota*, Moore, from the Andamans; differs in its straight bands, the outer band in *discinota* being recurved and crossed by pale veins, and in the absence of all markings below.

12. *Euproctis illanta*, n. sp.

♂ ♀. Above and below of a uniform cream-colour. Antennæ of the male with the shaft and plumes ochreous tinted. Fore

and hind wings uniformly coloured and clothed; the entire surface of both wings and body above and below without any markings. Expanse of wings, ♂ $1\frac{1}{10}$, ♀ $1\frac{4}{10}$ in.

Pona, September, 1888; Alibagh, near Bombay, March, 1888.

Allied to *E. postica*, Walker, which has, however, a black abdomen and white wings.

NOTODONTIDÆ.

DICRANURINÆ.

13. *Harpyia wisei*, n. sp. (Pl. VIII., fig. 3).

♀. Shaft of antennæ, front and top of head, body and fore wings silvery white; plumes of antennæ and all markings black; a line across at the back of the head; thorax with four cross macular lines; abdomen with broad bands on the upper half of each segment, and black spots on each side, pale at the base, and gradually darkening downwards; anal segment with a ring in the centre, enclosing a spot, and edged round with a black line. Fore wing with a mark at the base, and many transverse zigzag lines, and with two large marks like lunules at the end of cell, one inside and the other outside; first two lines near the base are broken, the second two almost regularly dentated, and enclose a pale black band; the remainder are dentated outwardly, forming lunules in the interspaces; costa marked with black, the largest black mark being near the apex, and large black spots on the outer margin in the interspaces. Hind wing pale black, with a short whitish fascia from the anal angle, and blackish spots on the outer margin in the interspaces. Under side: face and pectus black, body white, some black spots on the lower segments, and a black band across the last one; legs white, with black bands; both wings whitish, with blackish suffusions on the outer half; black marks on the costa and spots on the outer margin as above. Expanse of wings, $3\frac{1}{2}$ in.

N. Kanara, September, 1887 (*Wise*).

Allied to *H. litura*, Walker; has more numerous zigzag lines across fore wings, is much larger, and the central fascia is broader and more regularly dentated.

LASIOCAMPIDÆ.

14. *Eupterote hirsuta*, n. sp.

♂. Antennæ with the shaft brown, plumes reddish; thorax and abdomen of a uniform reddish brown; top of head and collar

ochreous; the ground colour of both wings of a bright ochreous yellow, thickly suffused with reddish brown, with the ground colour showing through in places, especially at the outer marginal portions beyond the discal line, which is duplex, runs across both wings, and on both wings curves inwardly on the lower, and outwardly on the upper portions, curving in on to the costa; the thorax is covered with brown hairs of an unusual thickness and length, and so is the basal portion of both wings, quite hiding the ground colour, and the usual transverse lunular lines, which are only visible here and there; the fore wing has some yellowish outwardly angular spots in the interspaces against the outside of the duplex line, the second from the hinder angle enclosing a large round black spot, and the third a pale brown one; on the hind wing is an outwardly dentated brown line similarly placed, with an indistinct spot near the angle. Under side: face and pectus dark brown; body and legs reddish brown; wings bright ochreous yellow; discal line on both wings with the black spot on fore wing and the same on hind wing plainer than above; a lunular line beyond, and lunular lines on the outer half of both wings inside the discal line, four on the fore wing and three on the hind wing. Expanse of wings, 4 in.

Khandalla, September, 1888 (*Hewett*).

Allied to *E. undata*, Blanchard, which also occurs at Khandalla; and this insect, of which I have only a single perfect specimen, may be only a sport of that species; but the curious curves of the discal band and the unusual colour of the wings make it look distinct, and certainly worth describing.

15. *Nisaga teta*, n. sp.

Wings longer and proportionately narrower than in *N. simplex*, Walker, the type of the genus; costa of fore wing nearly straight, except at the immediate base, where it is slightly arched. Wings of a bright yellowish fawn-colour, yellower than in *N. simplex*, and more glistening; hind wing darker than the fore wing, more ochreous; both wings above and below very uniform in their coloration, and absolutely without markings of any kind; antennæ with the plume brownish; abdomen above and below and legs tinged with ochreous brown. Expanse of wings, $2\frac{1}{10}$—$2\frac{2}{10}$ in.

Kolar, Mysore, October, 1888 (*Hampson*).

Allied to *N. simplex*, and somewhat of the appearance of the variety *N. modesta*, Moore, but of a different shape

and character, and is quite distinct; in this genus both the sexes are alike in having heavily-plumed antennæ.

16. *Messata acinia*, n. sp.

♂. Of a uniform pale yellow, tinged with ochreous fawn-colour. Fore wing with two brown longitudinal bands, which extend from the apex to the hinder margin, the 1st at one-third, and the 2nd at two-thirds, and are joined together on the border. Hind wing and under side of both wings unmarked; plumes of antennæ brownish; abdomen and legs reddish brown.

♀. Of a brighter yellow colour; bands paler and somewhat indistinct; other characters same as in the male. Expanse of wings, ♂ ♀ $2\frac{6}{10}$—$2\frac{7}{10}$ in.

North Kanara, July and August, 1886 (*Wise*); Khandalla, September, 1888 (*Hewett*).

Allied to *M. flavida*, Moore, Trans. Ent. Soc. Lond., 1884, p. 372, from the Nilgiri Hills; differs chiefly in having two bands instead of three, and a brown body instead of a yellow one.

GEOMETRITES.

EUSCHEMIDÆ.

17. *Euschema nelera*, n. sp.

♂ ♀. Antennæ and palpi black; both wings of a uniform pale purplish colour, bands and spots purplish black; wings thinly clothed; space between the antennæ black, a yellow band behind it; thorax pale purplish, suffused with yellow; three bands across the thorax, in front, behind, and in the middle, corresponding with similar bands on the wings; abdomen yellowish, with bands on the segments, bright chrome-yellow tips, and in the male with anal tufts of that colour. Fore wing with three longitudinal straight bands on the basal third, the lowest the longest, and commencing across the base of the hind wing; the band on the costa elbowed acutely inwards, and terminating near the end of the lowest band; a large spot at the end of the cell, and extending to the costa; costal line between this and the basal band also purplish black; a thick distorted discal band, which bends inwards below the spot, and a deep marginal band, which fines down to the hinder angle; the large spot and two outer bands really cover the outer third of the wing, leaving two pale purplish bands of spots. Hind wing with a large spot at end of cell, which runs inwards, paler in a short suffused band towards the abdominal margin; a discal

recurved band somewhat near the margin, and dentated outwardly on the veins in its centre; a submarginal row of spots, large at the apex, and touching the margin, becoming smaller towards the anal angle; four large bright ochreous marginal spots towards the anal angle in the male only. Under side: body yellow; legs yellow below, bluish grey above; abdomen of the female with segmental bands. Expanse of wings, ♂ ♀ $2\frac{9}{10}$—$3\frac{1}{10}$ in.

Matheran, October, 1886; Khandalla, December, 1882.

Allied to *E. transversa*, Walker, from Ceylon, which I have also got from North Kanara, somewhat similarly marked; but in that species the bands are thicker and closer together, and the large bright chrome-yellow spots on the hind wing are absent. This insect was wrongly identified by me as *E. malayana*, Guér., in P. Z. S., 1885, p. 864. It comes out in a regular swarm on the top of the Matheran and Khandalla Mountains for about a week every cold season, and flies by day and night.

18. *Euschema percota*, n. sp.

♂ ♀. Front of head and stripe behind the head yellow; palpi, antennæ, and all stripes and spots, purplish black; thorax and wings pale purplish; wings thinly clothed; thorax suffused with yellow in places; abdomen yellowish, with segmental bands; thorax with three bands across, corresponding to the three basal bands on the fore wings, which are as follows: 1st on costa, short, and sometimes broken into spots; 2nd about the same length; 3rd crossing the base of hind wing, and curving upwards across the 2nd band, and inwards on to the costa near the 1st band; two large spots below the cell, in the interspace, one above the other; apical third purplish black, showing a large spot of that colour at the end of the cell; beyond this is a pale purplish spot, and sometimes another smaller and indistinct spot again beyond; a pale streak also at the hinder angle. Hind wing marked like the hind wing of *E. nelera*, the spot at the end of the cell round, and a smaller spot between that and the abdominal margin; the spots on the outer margin also more round. Under side: body yellow; abdomen of the female with segmental bands; wings paler than above, spots prominent; outer purplish black colour of fore wings confined to the apex, some spots on the border, and a distorted macular band in the disc; hind wing as above, but with the discal band and marginal spots finer and paler. Expanse of wings, ♂ $3\frac{2}{10}$—$3\frac{5}{10}$, ♀ $3\frac{6}{10}$—4 in.

Matheran, October and December, 1886; Khandalla, October, 1887; Calicut, Tavandrum (*Hampson*); Lanaoli, May, 1888.

Differs from *E. nelera* in its black apical third of fore wings, and in the different arrangement of the basal markings; also in the absence of the chrome-yellow spots on the hind wings of the male: is allied to *E. palmyra*, Stoll, for which I mistook it (P. Z. S., 1885, p. 864), but is quite distinct, *E. palmyra* being closely allied to *E. transversa*, Walker. This insect also appears in swarms in the cold weather, and, like the rest of the genus, flies by day; one or two are occasionally also taken in the summer. There are specimens of it unnamed in the B. M., and in Mr. Moore's museum.

ZERENIIDÆ.

19. *Abraxas germana*, n. sp.

♂ ♀. Head and body ochreous, spotted with blackish brown; abdomen with three rows of spots; wings of a dull pale ochreous; hind wings paler and whiter; both wings covered with blackish brown irrorations, coarse and dark on fore wings, pale and minute on hind wings, especially towards the base; both wings crossed by a discal line or thin band, including brown spots on the veins in the hind wing, where the band is well covered outwardly above the middle, and composed of densely patched irrorations on the fore wing; but in the female it is merely an ordinary band of brownish colour; a brown spot at end of cell on hind wings, and a black marginal line interrupted by the veins on both wings in the male only; the female is otherwise the same as the male, but is more whitish in colour, nearly uniform on both wings; antennæ and legs brown. Below: body yellow, spotted with brown; wings as above, but in the males with the bands and spots very distinct; the irrorations suffused with longitudinal streaks nearly covering the wing. Expanse of wings. ♂ ♀ 2 in.

Nilgiri Hills (*Lindsay*).

Closely allied to *A. luteolaria*, Swinh., but is not so bright in coloration.

A. luteolaria has two bands across both wings, of a different character on the fore wings, and with the outer band nearer to the marginal border.

GEOMETRIDÆ.

20. *Thalassodes melica*, n. sp.

♂. Thorax and wings of a uniform sea-green; both wings crossed by ante-medial and discal faint whitish lines, nearly straight on fore wings, slightly curving outwards, more curved on the hind wings, lined inwardly with a slightly darker shade of green, the inner line of hind wings hardly visible; both wings irrorated with a few silvery speckles, and with the cilia silvery white. Hind wings produced below the middle into an acute angle; antennæ, abdomen, body below, and legs, yellowish; wings below of a uniform greyish white, unmarked. Expanse of wings, $\frac{8}{10}$ in.

Poona, November, 1887.

Allied to *T. graminea*, Hampson; differs in the more rounded apex of fore wings, and the straightness of the transverse lines on both wings, being in no way sinuous.

FIDONIDÆ.

21. *Zomia miscella*, n. sp.

♂ ♀. Body and fore wings of various shades of colour, from brownish green to pale ochreous brown; markings very much as in *Z. incitata*, Walker; the outer band more bent and produced outwardly in the middle, nearly touching the margin. Hind wings rich ochreous; the brown mark at the anal angle in the dark specimens continued up the abdominal border in a uniform shade of colour to the base, usually filling up the whole space behind the median vein; a brown spot at the end of the cell. Below: both wings coloured like the hind wings above; a brown spot at the end of each cell; the costa and outer portion of fore wings, and the whole surface of the hind wings, spotted with brown dots, suffused on the outer portions of the fore wings in some specimens; body and legs ochreous; antennæ coloured like the fore wings and bipectinated with very short bristles. Expanse of wings, $1\frac{5}{10}$—$1\frac{8}{10}$ in.

Khandalla, October, 1886; Nilgiri Hills, 6000 ft. (*Hampson*).

Is evidently the southern form of *Z. incitata*, Walker, from Sikkim; the short plume of the antennæ, however, would alone make it quite a distinct species, the plume of the male being less than half the depth of the Sikkim insect, and not so deep as the plume of the female of

that species; it differs chiefly also in the spots at the end of the cell of the hind wings above, and in all the wings below, and in the other spots and markings below, *Z. incitata* having no spot above, and is immaculate below, except for two slight reddish marks at the end of the cells.

22. *Hypochrosis intexta*, n. sp. (Pl. VIII., fig. 11).

♂. Antennæ blackish brown, plumes white at their base; top of head whitish; body and wings of a uniform brownish grey; wings covered with black irrorations, and with some pale chocolate-brown outwardly oblique bands, fore wings with two before the middle, the 2nd terminating in a square black patch on the costa; two bands beyond the middle, one discal and outwardly dentated in the middle with two teeth, the other marginal, the latter inwardly sinuous, and with a black mark near the hinder angle; a central black sinuous line from a smaller black patch on the costa near the apex, terminating in the middle of the wing, and two pale brown marks at the base. Hind wing with traces of the 2nd band near its base, and with the discal and marginal bands complete, the former with outer border, and the latter with inner border, dentated and edged with dark brown; a black central slightly sinuous line from the abdominal margin near the middle, towards the costal third, which it does not reach; costal portion whitish. Under side: body, legs, and wings pale chocolate-brown, paler than above; no markings except the two brown spots on the costa of the fore wings, which are faintly visible. Expanse of wings, $1\frac{1}{10}$ in.

N. Kanara (*Wise*).

I know of no species to which this insect has any near resemblance in its markings.

NOCTUES.

LEUCANIIDÆ.

23. *Axylia dispalata*, n. sp.

♂. Antennæ, palpi, and head brown; thorax, abdomen, and fore wings reddish grey; thorax and fore wings suffused with brown. Fore wings with the orbicular and reniform prominent, the former round and small, the latter much larger and more or less ear-shaped, generally pale, sometimes brown, the whole wing more or less dotted and streaked with black and brown, forming a fascia extending through the cell, and from the reniform, in a line to the outer margin, most of the space above is dark brown, and in

some specimens there are two transverse fasciæ before and beyond the middle; a duplex transverse discal row of black points, some pale spots on the costa on the apical half, marginal black points, and pale cilia marked with brown. Hind wing nearly pure white, unmarked. Under side: body and legs brownish; tarsi with pale bands.

♀. Like the male, but paler; the head and body are reddish grey, and the brown and black markings on fore wings are thinner, leaving the lower portions paler. Expanse of wings, 1 in.

Poona, September and October, 1882, August, 1887; Khandalla, October, 1886—87.

Allied to *A. renalis*, Moore, from Kashmir, Solon, and the Punjaub, which it superficially resembles; it is, however, smaller, differently coloured, the wings are narrower and shorter, apex rounded, and the markings, though somewhat similar, are of a different character, and the legs are differently coloured and marked.

HELIOTHIDÆ.

24. *Dorika curta*, n. sp.

♂ ♀. Antennæ, head, and thorax brown; abdomen and fore wings yellowish fawn-colour; hind wings white; fore wings with some darker longitudinal shades; a broad medial longitudinal blackish band from the base to near the outer margin; a short subapical blackish streak, black marginal points, some indications of a transverse row of discal blackish points, and some brownish marks on the cilia. Hind wings with minute black marginal points, otherwise unmarked. Under side: body and legs yellowish fawn-colour; wings whitish; fore wings with medial and costal blackish longitudinal fasciæ; both wings with black marginal points. Expanse of wings, 1—$1\frac{2}{10}$ in.

Poona, September, 1888.

Allied to *D. auriola*, Walker; is smaller, is not gilded like that species, differs in the shape of the stripes, and has the fore wings shorter and more square.

25. *Curubasa depicta*, n. sp. (Pl. VIII., fig. 4).

♀. Antennæ pinkish, palpi ochreous, thorax and fore wings bright silvery cream-colour; head and fore part of thorax pinkish lake, some marks of the same colour on the rest of the thorax; abdomen ochreous brown (being a female the colour here has probably changed somewhat since life). Fore wing with two

broad pinkish lake longitudinal bands with even edges, filling up the entire costal and hinder marginal spaces; cilia with some marks of the same colour. Hind wings greyish white, glistening, unmarked. Under side: body and legs greyish ochreous; abdomen with whitish segmental bands; wings greyish white, with some whiter longitudinal streaks. Expanse of wings, $1\frac{6}{10}$ in.

Khandalla, September, 1888.

Allied to *C. lanceolata*, Walker, xxxiii., 767; differs in the formation of the stripes, and in its much larger size, that species having the fore wings rose-coloured, with a central silvery stripe. I have a series of both sexes. Of this new species I have only one perfect female specimen, but it is such a beautiful insect, I am tempted to name and describe it.

26. *Masalia dora*, n. sp.

♂. Antennæ, palpi, and head pale fawn-colour; thorax and fore wings dark ochreous fawn-colour. Fore wings irrorated with black atoms, which in places are clustered together into indistinct longitudinal streaks; a brownish patch near the apex, and a row of diffuse indistinct submarginal transverse spots. Hind wings and abdomen silvery white, tinged with fawn-colour, unmarked; anal tuft reddish fawn-colour. Under side pale luteous fawn-colour; fore wing inwardly suffused with brown.

♀. Pale yellowish, shining; fore wing irrorated with reddish atoms, with longitudinal reddish streaks; hind wings, abdomen, and the entire under surface paler, and of a uniform pale shining greyish yellow. Expanse of wings, ♂ 1, ♀ $1\frac{2}{10}$ in.

Khandalla, October, 1886.

Allied to *M. irrorata*, Moore, but from which it widely differs in its coloration, in its brown cilia, and in the disposition and nature of the discal spots.

ACONTIIDÆ.

27. *Marimatha freda*, n. sp.

♂. Luteous fawn-colour; antennæ, palpi, head, fore part of thorax, and anal tuft ochreous. Fore wing with the costa brown, this colour broader and darker on the basal half; a duplex sinuous black discal line, chalybeous whitish in its interior, bending inwards above on to the costa, and throwing out a straight brown shade to the apex, with a brownish suffusion on the marginal space below it; marginal line blackish brown; cilia brownish, with a

pale basal line. Hind wing slightly paler than the fore wing, and suffused with grey. Under side luteous fawn-colour; wings suffused with brown. Expanse of wings, $\frac{9}{10}$ in.

Nilgiri Hills, two males (*Grant*).

Not allied to any Indian species known to me, but somewhat resembles *M. duplicalis*, Walker, xxxiv., p. 1205, from Sierra Leone.

28. *Tarache melanchlæna*, n. sp.

♂ ♀. Antennæ, palpi, head, and thorax blackish brown; wings pinkish grey, suffused almost all over with blackish brown. Fore wing with a broad central blackish brown band, angled outwardly just above the centre; basal and outer parts also dark blackish brown, leaving pale bands, showing the ground colour of the wing on each side of the central band. Hind wings and abdomen suffused all over with a paler brown colour; marginal line of both wings black; cilia brown, with a pale basal line. Under side coloured, suffused like the hind wings above. Expanse of wings, $\frac{6}{10}$—$\frac{7}{10}$ in.

North Kanara, June, 1887 (*Wise*).

Allied to *T. excisa*, Walker, but is altogether a blacker insect, without any silvery bands as in that species.

ANTHOPHILIDÆ.

29. *Hyela senna*, n. sp. (Pl. VIII., fig. 14).

Antennæ, palpi, body, and fore wings greyish yellow. Fore wing with a broad blackish brown longitudinal band, occupying nearly half the lower portion of the wing up to the outer third, above which it curves deeply on its inner margin, leaving an angle at the basal third, and from the outer third it runs straight to the apex, towards which it becomes attenuated; this band is edged with whitish yellow, and there are a number of brownish diffuse longitudinal marks all over the yellow portion of the wing. Hind wings brown. Under side of a uniform dirty grey. Expanse of wings, 6½-10th in.

Poona, November, 1887.

Is a much smaller insect than *H. latiritta*, and the brown band is differently disposed.

POAPHILIDÆ.

30. *Poaphila erica*, n. sp. (Pl. VIII., fig. 15).

Palpi, head, and fore part of thorax rich reddish ochreous; antennæ and fore wings chocolate-brown, covered with black atoms. Fore wing with two transverse dark brown straight bands or thick lines; ante-medial and discal, the latter duplex, caused by a dark brown sinuous line immediately beyond it; marginal points black. Hind wing blackish brown, tinged with pale chocolate, broadly blackish on the outer margin; cilia of both wings ochreous. Under side pale ochreous cinereous; fore wing with a blackish mark at end of cell, some central blackish suffusions, and blackish marginal space limited by the outer band; inner band obsolete. Hind wing with the mark at end of cell, slight blackish suffusion at marginal border, which has a discal band of blackish spots, and a submarginal band; both wings with black marginal lunular line; body and legs ochreous, tarsi brown. Expanse of wings, $1\frac{3}{10}$ in.

Khandalla, September, 1888 (*Hewett*).

Allied to *P. luteiceps*, Walker; chiefly differs in the coloration, in having an outer straight band instead of an acutely retracted one, in the position of the submarginal band, and in the colour and markings below.

CATEPHIDÆ.

31. *Gyrtona exsicca*, n. sp. (Pl. VIII., fig. 5).

Palpi, antennæ, head, body, and fore wings brown; palpi whitish on the inner sides. Fore wings with four or five indistinct sinuous transverse blackish lines at equal distances from each other; the first visible is on the basal third, and has a deep black point on the hinder margin; the last is the most sinuous, and is submarginal, and this and the two preceding it are deep black, though very fine and more or less disjointed; the first of these has an elongated deep black spot near the hinder margin, and in the central part of the wing are two or three black points; marginal line brown; fringe brown, paler. Hind wings pale greyish, semihyaline, with a brown deep border, diffuse inwardly. Under side whitish, unmarked. Expanse of wings, 1 in.

North Kanara (*Wise*).

Is shaped like *G. hylusalis*, Walker, but differs in the markings of the fore wings, and the colour and band of the hind wings.

HOMOPTERIDÆ.

32. *Alamis yendola*, n. sp.

♂ ♀. Antennæ, palpi, head, body, and wings pinkish grey; palpi with brown bands to the tips; both wings covered with many transverse brown sinuous lines and bands, forming on the fore wing a broad group of bands at the base and another in the middle, and a blackish patch angled downwards from the costa near the apex, and on the hind wing an indistinct discal band; both wings with a black submarginal festoon, and a pale marginal line; a brown cilia, with a black line at the base and a pale middle line. Under side much paler, with a number of sinuous transverse pale brown lines on both wings. Expanse of wings, $1\frac{2}{10}$ in.

Poona, October, 1882; Karachi, September, 1886.

Allied to *Alamis infligens*, Walker, but uniformly smaller, the wings shorter, deeper, and more rounded, and the markings, though of the same nature, are altogether differently disposed.

OPHIUSIDÆ.

33. *Athyrma intorta*, n. sp. (Pl. VIII., fig. 13).

♂. Palpi, head, fore part of thorax, and anal tuft ochreous; antennæ, body, and fore wings yellowish fawn-colour. Fore wing with a large distorted black patch, ringed with white at one-third from base, filling lower two-thirds of wing; on costa above is a brown mark; a discal white line from hinder margin beyond middle, sinuous, running upwards close to the inner patch, then distorted and curving much outwards, and running up to costa at one-fourth from apex; this line limits a black suffusion, which is suffused into the colour of the wing as it reaches the margin; an indistinct submarginal sinuous blackish line; marginal black spots. Hind wing blackish, darkest towards outer margin. Under side yellowish, a dot at end of each cell, some brown suffusions, especially on fore wings, a curved discal line across both wings, and brown marginal line. Expanse of wings, $1\frac{2}{10}$ in.

Bombay, October, 1886.

Allied to *Athyrma semilugens*, Walker (*Hydrelia*) = *Baniana luteiceps*, Walker; chiefly differs in the presence of the inner patch on fore wings, in the narrower outer margin, and the absence of the inner line on fore wings.

FOCILLIDÆ.

34. *Matella euphrona*, n. sp. (Pl. VIII., fig. 16).

Of a uniform yellowish fawn-colour; palpi whitish, flecked with black; wings irrorated and suffused with brown, with two large hyaline spots on the fore wing, one in the middle of the cell, nearly round, the other at the end larger and ear-shaped; a hyaline spot at the end of the cell in the hind wings; all the spots ringed with brown. Fore wings crossed by three transverse brown lines; ante-medial, medial and discal, curving outwardly, rather sinuous, the 1st and 2nd lines bending inwards on to the costa, the 1st inside the 1st spot, the 2nd outside the 2nd spot; a submarginal sinuous indistinct pale line. Hind wings with two lines, corresponding to the two outer lines of fore wings; a submarginal pale line; marginal line of both wings black; cilia interlined. Under side: wings marked as above, but with prominent dark blackish brown suffusions. Expanse of wings, $\frac{9}{10}$ in.

Poona, October, 1887.

Allied to *M. accingalis*, Walker; is similarly coloured, but much smaller, the hyaline spots larger and the bands straighter and differently disposed, the outer one terminating at the anal angle instead of the outer third of abdominal margin; Walker's type is a female fragment I overlooked when describing *M. caduca* (P. Z. S., 1885, p. 470), but, having now a long series, I am convinced they are identical.

35. *Nagadeba mistura*, n. sp.

♂ ♀. Chocolate-grey; palpi with whitish inner sides and tips; abdomen with whitish segmental bands above. Fore wings crossed by seven or eight sinuous grey lines; costa with two white marks, 1st at one-third from base, 2nd at one-third from apex, where the costal border is depressed; in some specimens there is a whitish angular space here, which, with the naked eye, looks like a wing-fold; marginal line black, incomplete, prominently black below the apex, and there are some brown shades on the costal and central portions of the wing. Hind wing paler, crossed by three or four indistinct sinuous grey lines; black lunular marginal line; cilia of both wings interlined with black. Under side darkly suffused with black. Expanse of wings, $\frac{6}{10}$—$\frac{8}{10}$ in.

Poona, September and October, 1887.

Allied to nothing I know of.

THERMESIIDÆ.

PTEROGONIA, gen. nov.

Fore wing rather short, broad; costa rather straight to near the end, apex pointed; exterior margin angled below the apex and again at the middle, below which it is very oblique, the posterior margin being very convex. Hind wing short; apex very convex, exterior margin slightly convex. Body stout; thorax slightly crested in front; palpi erect, projecting slightly above the head; apex pointed; antennæ setaceous; legs thick, fore tibiæ stout, hind tibiæ with two pairs of spurs.

This genus is allied to *Doranaga*, Moore, Lep. Ceylon, iii., p. 553, and will include *Pterogonia* (*Doranaga*) *striatura*, Moore, *l. c.*, p. 553, pl. 214, f. 11. The type of the genus *Doranaga* is *D. apicalas*, Moore, *l. c.*, which is identical with *Doranaga* (*Ariolica*) *leucospila*, Walker, xxxiii., p. 788.

36. *Pterogonia episcopalis*, n. sp.

♂. Antennæ, palpi, thorax, and fore wings lilacine-grey; abdomen dusky; thorax and palpi with a few dark ferruginous speckles. Fore wings with numerous transverse broad ferruginous striæ clouding the wing, darkest obliquely from the costa near the base for two-thirds the area, a slender outwardly oblique transverse wavy line from the costa one-third from the base, a zigzag similar line one-fifth from the apex, beyond which are a few apical submarginal blackish striæ, and two or three black speckles towards the posterior angle; within the end of the cell is a large and very prominent silvery white mitre-shaped spot. Hind wing cinereous white, with a broad dusky marginal band; legs cinereous white, tarsi dusky, fore tibiæ ferruginous. Expanse of wings, $1\frac{8}{10}$ in.

Coonoor, Nilgiri Hills (*Lindsay*); type-specimen in coll. Moore.

Somewhat resembles *Doranaga striatura*, Moore.

P. EPISCOPALIS.

37. *Capnodes cascalis*, n. sp. (Pl. VIII., fig. 6, ♂; 10, ♀).

♂ ♀. Brownish fawn-colour; palpi striped with pale yellowish and pale at the tips; thorax with a brown band in front; wings sparsely irrorated with brown atoms; an indistinct sinuous pale brown ante-medial transverse line on fore wings, orbicular and reniform very indistinct; a straight brown thin band across both wings, from the abdominal margin before the middle to near the costa of fore wings, where it joins a curved band enclosing a blackish space, suffused in parts with white; a discal row of brown points, outwardly edged with white, a submarginal row of black points very close to the margin, and a black marginal line. Under side paler, irrorated with brown atoms, indications of a faint discal band across both wings enclosing some brown points; submarginal black points, and marginal line as above; legs with tibiæ and tarsi brown above, with yellow bands. Expanse of wings, $1\frac{3}{10}$ in.

Travancore (*Cotton*); Khandalla, September, 1883 (*Hewett*).

Distinguishable from *C. pallens*, Moore, by the straight band across both wings, and by the black and white space on the costa near apex.

HERMINIIDÆ.

38. *Oglasa costiplaga*.

Oglasa costipannosa (nom preoc.), Swinhoe, Trans. Ent. Soc. Lond., 1890, p. 266, n. 517.

Rangoon, Moulmein, and Bhamo.

The insect described by Mr. Moore as *Egnasia costipannosa*, Descr. Ind. Lep. Atk., ii., p. 184 (1882), is, I find on examination of the genus, *Oglasa*, and therefore it becomes necessary for me to adopt another name for my insect.

PYRALES.

HAPALIADÆ.

39. *Crocidophora griseifusa*, n. sp.

♂. Dull pearly iridescent grey. Fore wing with a broad dark band along outer margin, narrowing slightly towards outer angle; an indistinct dark band from the costa one-third from apex, bent inwards at the median vein, where it is joined by a band from the centre of costa, reaching the hinder margin at centre. Hind wing with a dark outer border, broad on apical half, narrow towards

anal angle ; an indistinct dark band, erect, from centre of costa to the 2nd median veinlet, then curved round to inner margin above the anal angle ; the raised sexual tuft of hairs on the under side of fore wing below the cell is very large and dark, and the median vein very much distorted, so as to pass round above it.

♀. Suffused with golden ochreous, the markings still more indistinct than in the male, the band on fore wing slightly waved, on hind wing more evenly curved. Expanse of wings, ♂ $1\frac{2}{10}$, ♀ $1\frac{4}{10}$ in.

North Kanara, June, 1887 (*Wise*); Nilgiri Hills, southern slopes (*Lindsay*).

Is somewhat akin to the North American ochreous forms.

Explanation of Plate VIII.

Fig. 1. *Syntomis magna*, n. sp., p. 133.
2. ,, *mota*, n. sp., p. 134.
3. *Harpyia wisei*, ♀, n. sp., p. 139.
4. *Curubasa depicta*, ♀, n. sp., p. 146.
5. *Gyrtona excisa*, n. sp., p. 149.
6. *Capnodes cascalis*, ♂, n. sp., p. 153.
7. *Syntomis lydia*, ♂, n. sp., p. 134.
8. *Alpenus eximia*, n. sp., p. 137.
9. *Ræselia culaca*, ♂, n. sp., p. 137.
10. *Capnodes cascalis*, ♀, n. sp., p. 153.
11. *Hypochrosis intexta*, ♂, n. sp., p. 145.
12. *Tascia gana*, n. sp., p. 133.
13. *Athyrma intorta*, n. sp., p. 150.
14. *Hyela senna*, n. sp., p. 148.
15. *Poaphila erica*, n. sp., p. 149.
16. *Matella euphrona*, n. sp., p. 151.

V. *Conspicuous Effects on the markings and colouring of Lepidoptera caused by exposure of the pupæ to different temperature conditions.* By Frederic Merrifield, F.E.S.

[Read December 3rd, 1890.]

Plate IX.

In reviewing the results of my temperature experiments of last year, I found some which could not altogether be explained by the simple theory that a moderately low temperature, applied to the pupa for a certain minimum period, caused in the imago darkness of colouring or a change of markings in a definite direction. In particular they indicated that the part of the pupal period during which the temperature was applied might have much to do with the result, and therefore I determined to conduct experiments specially directed to ascertain whether there was such a period, and, if so, to define it. During the earlier part of this investigation I was under the impression, derived from the accounts of experiments by other observers, that the earliest stage of the pupal period was the sensitive time, and, at all events, that the last few days were of little importance; and accordingly, in certain elaborate experiments which I made, consisting of the forcing of pupæ immediately after pupation for periods differing by a few days, followed by cooling for different periods; and the converse,—*i. e.* cooling succeeded by forcing,—I generally finished in both cases by forcing the pupa for a few of its last days, as a matter of convenience, in order to get it out of the way for further work. Some facts observed, however, during the early part of the past summer, led me to suspect that for certain effects the later days of the pupal period were especially important, and I instituted accordingly some experiments directed to ascertain whether it was so.

I tried these with the two species I had before found sensitive to temperature,—namely, *S. illustraria* (*tetralunaria*) and *E. autumnaria*,—and the results fully con-

firmed my suspicion. I obtained more striking results than before, and the fact was brought out that the change of *markings* due to temperature was caused by temperature conditions so different from those which caused *colouring, or darkness,* that it became possible artificially to produce either effect with little or no admixture of the other; so, for example, as to get from the same brood of an insect which is subject to seasonal dimorphism what may be termed, speaking generally, four distinct temperature varieties, *viz.*, (1) summer markings with summer colouring, (2) summer markings with an approach towards spring colouring, (3) spring markings with summer colouring, (4) spring markings with spring colouring. It will be seen that all these results have been more or less fully obtained; three of them from a single brood, and the fourth from another precisely similar brood, might certainly have been obtained from the first brood had a portion of it been subjected to the appropriate treatment.

When I use the term spring and summer markings or colouring (in which last word I include lightness or darkness of hue) I am only speaking generally. I have not yet, I think, met with a case where the summer moth has been made to assume the exact colouring of the spring insect, but, as regards markings, I think the resemblance is complete, or nearly so.

For purposes of description, it has been found necessary to divide the pupal period into four stages, the duration of each of which greatly depends on the temperature, *viz.*;—(1) the soft condition, which, at ordinary summer temperature, continues about twenty-four hours or less; (2) the central inactive condition, which may last for a few days only or for many months; (3) what I would term the penultimate stage, being that separating the inactive period from (4) the last stage, commencing when the colours of the pupal insect begin to show. Each of the stages (3) and (4), at the summer temperature, seems to last, in the two species experimented on, two or three days, but at a lower temperature can extend over several weeks.

The icing temperature may be taken as a steady 33° Fahr. (subject to the qualification that from about the beginning of July of this year to the 10th August, during which the pupæ, instead of being in an ice-box, were placed under the bottom of the ice-holder in the

refrigerator, it ranged from about 35° to 39°); the "cooling" temperature, being that of the interior of the refrigerator, ranged from 39° to 55°, averaging in summer about 47°; the forcing temperature was about 80°. The "out-door" and "room" or "in-door" temperature, especially the former, varied, but I give the amount of it, as far as practicable, in each case.

I may premise that (with the aid of an assistant) I have tried many more experiments than I describe here; some necessarily gave negative or inconclusive results, and with these, though useful to myself, I will not trouble the Society.

It will perhaps be remembered that last year's experiments showed that a naturally rather dark-coloured brood of *illustraria* of the summer emergence, when subjected to icing for periods successively lengthened by fourteen days, produced moths darker in colour, and, after a period averaging twelve weeks or more, for the most part distinctly altered in markings so as to approach those of the spring emergence. This year I determined to experiment with broods from a race selected for its tendency to light orange or chestnut colouring, which, to give it a short distinctive name, I called "red," and which, being of a lighter colour, would be better adapted to show dark effects.

Experiments on Illustraria.

For this purpose I took two broods of the spring larvæ of the 'red" race, forcing the larvæ to get them out of the way of other experiments, and they pupated between 10th and 25th June. The first of these I called "red *c*"; it produced me about 59 pupæ.

Ten of these "red *c*," taken promiscuously from day to day, were forced at the temperature of 80°, and produced eight moths, all of the light warm tint proper to the race, and in all respects of marking and colouring belonging to the summer type. Two of them are shown as Figs. 3 and 4 in the Plate.

The rest were iced from day to day as they hardened, and on the 14th Sept., *i. e.* after about twelve weeks' icing, were taken out of the ice-box and subjected to differential treatment as follows:—

(1) *Icing twelve weeks followed by forcing.*—Twenty-three were thus forced, and after five days' forcing they began to emerge. Nine came out on the fifth day; the rest were then beginning to show the colour of the perfect insect, and would doubtless have

emerged on that day or in the next day or two. Ten of them were placed at the "cooling" temperature, then averaging 43°, and five of these, besides some cripples, emerged in from two to eight days. Of the remaining thirteen, eleven emerged uncrippled or nearly so. There is no material difference between those which were thus differently treated. They show an interesting combination of colouring and markings, *viz.* a *colouring* approximating to that of the *summer* emergence with, in all but 2 or 3 individuals, the *markings* proper to the *spring* emergence. Nos. 5 and 6 in the Plate are typical examples of them.

This experiment seems to show (1) that though icing the summer pupæ for twelve weeks develops in general the spring markings, yet that after the change in markings has thus been effected, forcing during the last five days brings out the moths in the characteristic summer colouring; (2) that exposure to a low temperature (about 43°) when the insect is in the ultimate pupal stage, *i.e.* when the colours of the imago are beginning to show, makes no difference.

(*b*) *Icing twelve weeks, followed by a low or moderate temperature.*—The remainder of the "red *c*," twenty-six in number, were on the 14th Sept. placed *out of doors*, and all emerged in from nine to sixteen days, the temperature at 8 a.m. averaging about 57°. They showed not only the *spring markings*, but, as will be seen in the Plate, figs. 7 and 8, a *dark colour*, in some cases closely approximating to that of the spring emergence. With two or three exceptions, *all* are darker than any of those in the preceding experiment, and most are much darker. We thus have the spring markings and a close approximation to the spring colouring produced by subjecting to a moderately low temperature, averaging 57° at 8 a.m., pupæ the moths from which would otherwise have shown the markings and colouring proper to the summer emergence.

Three of the twenty-six were, after eight days of the out-door temperature "cooled" (43°) emerging respectively in 12, 16 and 30 days; but this treatment made no appreciable difference in their appearance.

(*c*) *The same, succeeded by forcing during the ultimate period.*—Four of the twenty-six were after eight days *forced*, and three of them emerged in from $1\frac{1}{2}$ to $2\frac{1}{2}$ days; in two of these there is a change in a direction towards the summer colouring.

Taken as a whole, the experiments on "red *c*" seem to show that the ordinary out-door temperature of a rather warm September, which, taken at 8 a.m. during the time of exposure, averaged about 57°, is as efficacious to produce a dark colouring as

is the much lower "cooling" temperature (of 43°), but that exposing the pupa *during its last two or three days* to a forcing temperature may be enough to affect the colouring in the opposite direction.

Period of pupal development when temperature operates on colour.—The next experiments were made with the object of endeavouring to define still more closely the period of pupal development during which the temperature has to be applied in order to develop its effects on colouring. For this purpose the second "red" brood, distinguished as "red *a*," which had been at the icing temperature for about fourteen weeks, was taken. Eight moths, the pupæ of which had been forced from the time they hardened, are scarcely to be distinguished from the "red *c*" similarly treated, being of the same light warm tint, and with the usual summer markings. Of those not so forced I had about seventy pupæ. This brood, however, was not so healthy and vigorous as the "red *c*'s". Whether from this or some other cause, the differences in colouring caused by the treatment are not so marked as in "red *c*."

It should be premised that all the experiments on *illustraria* under heads (*d*) and (*e*) subsequently detailed were tried with summer pupæ which had been iced about fourteen weeks, a treatment which, as already shown, appears to affect the markings rather than the colouring.

Fourteen male and fourteen female pupæ were, on the 25th Sept., taken from the ice and divided into two parts, and were then treated as follows:—

(*d*) *Forcing for different periods succeeded by a moderately low temperature.*—With the first division, consisting of six males and six females, the experiment was tried of first forcing and then from day to day removing into the open air, which at 8 a.m. averaged about 56°. From the Table (I.) appended it will be seen that they were, when taken from the ice on the 25th, ready to emerge in about five days of a forcing temperature. This indicates that the pupal period, measured by the progress made, was then not quite half over, for I have found that the summer pupa exposed to a forcing temperature usually emerges in from eight to ten days. The results were as follows:—Nos. 1 ♂ and 2 ♂, and Nos. 1 ♀ and 2 ♀, which had been deprived of a forcing temperature during two or three out of their last five days, are decidedly darker than the others; of the remainder, No. 3 ♂, which had been deprived of but one day's forcing, is lighter, No. 5 ♂ was accidentally lost, and No. 6 ♂, which was forced the whole of the five days, is almost of the summer colouring of the

parents which had been forced all through. There is little difference between the females Nos. 3, 4, 5 and 6, two of which are slightly crippled; in general they are nearer to the spring than the summer type of colouring.

(*e*) *Moderately low temperature for different periods followed by forcing.*—With the second division, consisting of eight males and eight females, the converse experiment was tried by placing the pupæ, when taken from the ice, in the open air, and removing them at intervals to the forcing-box. The intervals were of two or three days, instead of a single day, in order to make allowance for the slower rate of progress at a lower temperature. The results are recorded in Table II. They fully confirm the results of the experiment last recorded. Of the males, Nos. 1, 2, 3, 4, and 5, all of which had had from one and a half to four days' forcing, approach the summer colouring, and there is not much difference between them; No. 6, with only one day's forcing, is darker. Nos. 7 and 8, with no forcing at all, are decidedly darker. Of the females, Nos. 7 and 8, with no forcing at all, are decidedly darker than Nos. 1, 2, 3, 4, and 5, which had had from one to three and a half days' forcing.

The last class of experiments was repeated with pupæ from another brood not of the "red" type, offspring of a brood kindly reared for me by Mr. Hollis, but of a more ordinary and variable colour. They were contemporaries of the "red *a*," and fourteen of them were treated in exactly the same way, six males and six females being in the same manner selected for first forcing and then outdoor exposure, and eight males and eight females for outdoor exposure first and then forcing. The results are in the same direction, though not so marked. The experiments with "red *a*" and with the last-named brood showed that about three days of a temperature averaging 56° were equivalent, in the rate of pupal progress, to one day at 80°.

The general result of the experiments on the three last-mentioned broods may be stated to be that from two to three days' forcing during the last parts of the pupal stage may be enough to affect the colouring, and in many cases to a very marked degree.

(*f*) *Ordinary indoor temperature, followed by low temperature.*—Another experiment, partly founded on an accidental occurrence, shows corresponding results, from the exposure of part of a summer brood to the lower "cooling" temperature. A red brood of the third generation, fed up rapidly, and rather unexpectedly pupated before the middle of August. They were brought indoors, where more than a dozen were found to have emerged on the 21st August at the ordinary temperature of the room. The remainder were

then placed in the refrigerator, where by the 6th September twenty more had emerged. All are slightly darker than their forced red parents of the second generation, but such as emerged after the 15th September, *i. e.*, after twenty-six days of the low temperature, are decidedly darker than the others. A light uncooled male and another cooled are given as Figs. 1 and 2 in the Plate.

The conclusions to be drawn from this experiment seem to be (1) that keeping the pupæ at the ordinary room temperature, probably about 65° to 70°, made the moths slightly darker than their parents, which were forced; (2) that at the low temperature of the refrigerator, averaging at this time, I should think, about 43°, three or four weeks did not represent, in pupal progress of development, more than two or three days of a forcing temperature, the lower temperature, as in the other cases, producing a darkness of colouring.

In connection with the effect produced by moderate differences of temperature, I may here mention that in two broods of *illustraria* pupæ, kindly brought up for me by Mr. Weldon at Plymouth, and kept indoors, some that emerged within a day or two of their arrival in June and July are conspicuously darker in colouring than the rest of the broods which were forced. I should think it improbable that the unforced ones had been at a lower average temperature than 60°.

Experiments on E. autumnaria.

The other systematic experiments tried were with *E. autumnaria*. Dr. Chapman kindly sent me two large batches of eggs, the moths from which I found, after a few had been forced, were very similar; and after a time I mixed the larvæ.

(*g*) *Forcing all through, or brief cooling followed by forcing.*—Some were forced all through as pupæ; others were cooled for 3, 7, 10, 14, 17, and 21 days, then forced, emerging in from 10 to 15 days of the forcing temperature. Thirty moths emerged (rejecting cripples). There are considerable individual differences among these, but the only great difference of a general character is that after about 14 or 17 days' cooling the colouring and markings are less vivid, the ground colour is dulled, the spotting blurred, the outer line broadened, and the inner line shows a tendency to disappear.

(*h*) *Cooling, followed by an ordinary indoor temperature.*—Others, after being cooled for 7, 10, 14, 17, 21, and 28 days were then, instead of being forced, kept at the ordinary temperature of the room, averaging, I think, about 65° to 70° in July, till they emerged, which they did, to the number of 20 (rejecting cripples), in from 13 to 21 days. These, also showing considerable individual

variation, are, as a rule, very decidedly darker than those which had been finally forced, viz. (*g*).

(*i*) *Cooling five or six weeks, followed by forcing.*—Other larvæ were sleeved, and pupated during the first three weeks of August. They were "cooled" within a few days after pupation, and taken out of the refrigerator on the 14th September, *i. e.*, after about five or six weeks, and forced, emerging in from six to eight days (a few of them being taken out of the forcing-box, and replaced in the refrigerator when the colouring of the perfect moth began to show; there is no marked difference in those so treated). The colouring of all, though dull, is not particularly dark, decidedly not so dark as in those of experiment (*h*). About twenty emerged (rejecting cripples).

(*j*) *Cooling five or six weeks, followed by different temperatures.*—Others, which had been cooled for five or six weeks, were afterwards placed at the ordinary outdoor temperature, averaging about 56° at 8 a.m., emerging in from 12½ to 21 days, some of them being on the eighth day placed at the "cooling" temperature, and emerging in from 2½ to 16½ days more; others, being on the eighth day forced, and emerging in from 2½ to 5 days afterwards. About sixteen emerged (rejecting cripples). Nearly all, *except those thus forced*, are dark, most very dark; those cooled being little, if at all, darker than those left at the ordinary temperature.

The tendency to dulness, to the blurring of spots and broadening of the outer line, and to the disappearance of the "inner line," is to be remarked in most of these included in experiment (*j*).

Figs. 11 and 12 in the illustration represent those that were forced without any or very brief previous cooling (*g*); Figs. 13 and 14, those cooled several weeks, and then forced (*i*); Figs. 15 and 16, those cooled several weeks, and then placed at a low, or moderately low, temperature till emergence (*j*).

Effects of Moisture.

Some experiments in 1888 seemed to show no difference in markings or colouring between pupæ of *illustraria* kept moist, and others in a quite dry atmosphere. This year I placed two lots, each of six pupæ of *autumnaria*, as soon as they had hardened, on sand kept wet in jam-pots covered with closely-fitting pieces of glass, one jam-pot (experiment *k*) being placed in the refrigerator 28 days, and then in the room, till the moths emerged, which four of them did in from 17 to 19 days more (two having died); the other (experiment *l*) in the forcing-box, where five out of the six emerged in from 12 to 16 days. Afterwards (experiment *m*) four

more pupæ were placed in a flower-pot on wet moss kept saturated with water, and covered with a piece of glass and placed out of doors; all emerged, two being cripples. Similar experiments (experiments *n* and o) to the first two were tried with two divisions, respectively of five and six summer pupæ of *illustraria*, all of which emerged, two being somewhat crippled. Two *autumnaria*, out of those kept moist, are slightly darker than the *average* of those kept dry, though not so dark as some of these. With that exception, if it be one, there is no appreciable difference in the case of that species, and none in *illustraria*, between such as were kept moist and such as were kept dry, but were in all other respects similarly treated. These results do not support the theory that exposure of the pupæ to moisture darkens the colour of the imago. I do not of course doubt the observations made which tend to show that some insects bred in moist situations are generally darker than the same species bred in drier localities, nor do I fail to recognise the great weight attaching to the opinion on this subject of some highly qualified authorities; indeed, it appears to me probable that, especially in countries where the difference of seasons is rather that between wetness and dryness than between warmth and coldness, moisture affects colour; but I would venture to make the remark that I believe most of the English Lepidoptera on which this effect has been observed emerge in the summer, and that wetness in summer, whether owing to a rainy mountainous locality or to the occurrence of a rainy season, causes a relatively low temperature; and it has been shown that the difference of temperature between a warm English summer and a cool one is sufficient to produce a very substantial darkening effect.

Experiments with other Lepidoptera.

(*p*) At the end of June a few recent pupæ and pupating larvæ of *V. urticæ*, all probably from the same brood, were given to me by Mr. Vine; some were placed at 80°, and others in the refrigerator at about 47°. Three of the former emerged in seven days; one of the latter after five weeks' cooling. It differs materially from the other three, the darker patches and the blue crescents having spread considerably, and the ground colour being duller.*

* This is open to the observation that it is the case of a single individual, but the inference from it is much strengthened by the statement of Mr. Jenner Weir, in the discussion which followed this paper, that so dark an example of this common European species is rarely met with, and by the statement (see Weismann's 'Studies in Heredity,' by Meldola) that the species becomes black in northern latitudes.

(*q*) *B. quercus.*—Experiments with this species have not yet been brought to a conclusion, but I have had out a number of the var. *callunæ*, from Aberdeen and Perth, at a forcing temperature; and these are certainly lighter in colouring than the ordinary *callunæ*, and not greatly to be distinguished from the ordinary *B. quercus.*

General Conclusions.

All the experiments, so far, seem to point to the conclusions:—

1. That both the markings and the colouring of the perfect insect may be materially affected by the temperature to which the pupa is exposed.

2. That the *markings* are chiefly affected by long-continued exposure, probably previous to the time when the insect has begun to go through the changes between the central inactive stage and emergence.

3. That the *colouring* is chiefly affected during the penultimate pupal stage, *i. e.*, before the colouring of the imago begins to show.

4. That a low temperature during this penultimate stage causes darkness, a high temperature during the same period having the opposite effect.

5. That, in the species operated on, a difference between 80° and 57° is sufficient to produce the extreme variation in darkness caused by temperature, a further lowering of the temperature having no further effect on it. (Taken in connexion with the others, previously published, these experiments show further that nearly the full effect in colouring may be produced by a much narrower range of temperature, *viz.*, from 76° or 80° to 65° in *autumnaria*, from 73° to 60° in *illustraria*.)

6. That in these species dryness or moisture during the pupal period, whether during a low temperature or a high one, has little or no effect on the colouring of the imago.

These conclusions may be treated as established as regards *illustraria* and *autumnaria*. Of course a much larger number of species should be tried before they can be treated as applicable generally. I do not doubt that protective requirements, hereditary tendencies, and probably other climatic conditions than those of temperature, and other causes that need not be enumerated, have their part in affecting colour; but the facts

ascertained certainly point to the probability of *some* general connection between the temperature during the pupal period and the colouring of Lepidoptera. As regards the species experimented on by me, however, though I am satisfied that temperature is the chief cause of the general changes of colour, as distinguished from individual variations produced, there are certain slighter variations of a general character which rather indicate that other external influences also operate; and these, I hope, may be made the subject of further investigation.

The results obtained appear also to indicate that probably some local climatic varieties, and even seasonal varieties, may be found to be, in part at least, temperature forms of the individual; and, looked at from this point of view, they appear to me to lend some support to Lord Walsingham's theory as to the advantages derived by an insect in a cold region from being of a dark colour, for they show that, if that is an advantage, it is one that can be acquired, not only by a race for use in a cold locality, but by individuals for use in a cold season. I think it quite clear that if a cool week supervened in Southern England between the beginning and the middle of July, or a hot week in the middle of April, at either of which times many of the pupæ of *illustraria* would be in what I have called the penultimate pupal stage, most of these insects which it found in that stage would have their colouring affected. It would appear that even two or three hot days, if they came exactly at the right period, would be enough for the purpose; and I need hardly observe that it is very unlikely that these are the only species that would be so affected.

There is another general suggestion which I venture to make in concluding. If Prof. Weismann's theory is accepted, that the existing forms of most European and some North American Lepidoptera have come to us from a glacial period or climate, and that icing the pupa causes the insect to "throw back" to its earlier form, then experiments, of the kind tried, on the pupæ might assist us in tracing the evolution of the markings on the wings of some of the most highly developed modern forms.

TABLE I.—*Illustraria* pupæ ("red *a*") iced 14 weeks, afterwards forced for varying periods, then exposed to outdoor temperature, averaging 56°.

MALES.

No.	Forced.	Placed outdoors.	Emerged.	Days.		
				Forced	Outd.	Total.
1	25 ix, 8 a.m.	27 ix, 7 a.m.	7 x, 6.30 a.m.	2	10	12
2	,, ,,	28 ix, 7 a.m.	4 x, 7.30 a.m.	3	6	9
3	,, ,,	29 ix, 6.30 a.m.	3 x, 8 a.m.	4	4	8
4	,, ,,	30 ix, 6.30 a.m.	30 ix, 5 p.m.	5	½	5½
5	,, ,,	Lost.				
6	,, ,,	0 0 0	30 ix, 6.30 a.m.	5	0	5

FEMALES.

No.	Forced.	Placed outdoors.	Emerged.	Days.		
				Forced	Outd.	Total.
1	25 ix, 8 a.m.	27 ix, 7 a.m.	6 x, 5 p.m.	2	9½	11½
2	,, ,,	28 ix, 7 a.m.	5 x, 7 a.m.	3	7	10
3	,, ,,	29 ix, 6.30 a.m.	2 x, 5 p.m.	4	3½	7½
4	,, ,,	0 0 0	30 ix, 6.30 a.m.	5	0	5
5	,, ,,	0 0 0	30 ix, 7 a.m.	5	0	5
6	,, ,,	0 0 0	30 ix, 5 p.m.	5½	0	5½

TABLE II.—Same; but, after icing, first placed outdoors, at about 56°, for varying periods, then forced.

MALES.

No.	Placed outdoors.	Forced.	Emerged.	Days.		
				Outd.	Forced	Total.
1	25 ix, 8 a.m.	28 ix, 7 a.m.	2 x, 6.30 a.m.	3	4	7
2	,, ,,	30 ix, 7 a.m.	4 x, 6.30 a.m.	5	4	9
3	,, ,,	3 x, 7 a.m.	6 x, 6.30 a.m.	8	3	11
4	,, ,,	5 x, 7 a.m.	6 x, 5 p.m.	10	1½	11½
5	,, ,,	7 x, 6.30 a.m.	8 x, 5 p.m.	12	1½	13½
6	,, ,,	8 x, 7 a.m.	9 x, 6.30 p.m.	13	1	14
7	,, ,,	0 0 0	14 x, 9 a.m.	19	0	19
8	,, ,,	0 0 0	10 x, 8.30 a.m.	15	0	15

FEMALES.

No.	Placed outdoors.	Forced.	Emerged.	Days.		
				Outd.	Forced	Total.
1	25 ix, 8 a.m.	28 ix, 7 a.m.	1 x, 5 p.m.	3	3½	6½
2	,, ,,	30 ix, 7 a.m.	3 x, 7 a.m.	5	3	8
3	,, ,,	3 x, 7 a.m.	5 x, 7.30 a.m.	8	2	10
4	,, ,,	5 x, 7 a.m.	7 x, 7 a.m.	10	2	12
5	,, ,,	7 x, 6.30 a.m.	8 x, 6.30 a.m.	12	1	13
6	,, ,,	8 x, 7 a.m.	Died.			
7	,, ,,	0 0 0	11 x, 6.30 a.m.	16	0	16
8	,, ,,	0 0 0	11 x, 6.30 a.m.	16	0	16

P.S.—Note.—*March*, 1891. I am now able to add that the colouring of the *spring* emergence of *illustraria* is as much, or nearly as much, affected by temperature during the penultimate pupal period as is that of the summer emergence. This has been established in the case of three different broods, portions of each having been subjected to temperatures of 60° and 80° respectively; the latter often in colouring very closely approach the light chestnut-orange summer type. This is interesting in reference to Prof. Weismann's theory, that in cases of this kind the moth from the summer pupa can be caused to resemble that from the winter pupa, but not *vice versâ*, as it shows that *either form* is equally ready, on the suitable temperature stimulus being applied, to assume the characteristic appearance of the other, *so far as colouring is concerned*. In other respects my observations are in accord with that theory. Thus, I have never been able to cause the moth from the winter pupa to take the *markings* proper to the moth from the summer pupa, whereas the moth from the summer pupa can be made in markings to resemble almost exactly that from the winter pupa; nor have I been able to cause the moth from the winter pupa to emerge in a period approaching in brevity that of the summer pupa; indeed, in the great majority of cases, the early and continued exposure of the winter pupa to a temperature of 80°, or even 60°, caused its death.—F. M.

Explanation of Plate IX.

S. illustraria.

Fig. 1. Summer brood, ♂, not cooled.

2. Same brood, ♂, cooled in its later pupal stages.

Figs. 3 (♂), 4 (♀). Summer brood, forced at 80° till emergence.

5 (♂), 6 (♀). Same brood, iced 12 weeks, then forced at 80° till emergence.

7 (♂), 8 (♀). Same brood, iced 12 weeks, then placed at about 57° till emergence.

9 (♂), 10 (♀). Examples of ordinary spring emergence.

The resemblance of Figs. 5 and 6 to Figs. 3 and 4 in colouring, to Figs. 7 and 8 in markings, will be noticed.

E. autumnaria.

Figs. 11 (♂), 12 (♀). Forced at 80° till emergence.

13 (♂), 14 (♀). Iced 5 weeks, then forced at 80° till emergence.

15 (♂), 16 (♀). Iced 5 weeks, then placed at about 57° till emergence.

VI. *On some recent additions to the list of South African butterflies.* By Roland Trimen, F.R.S., F.L.S., Curator of the South African Museum, Cape Town.

[Read February 4th, 1891.]

The butterflies to which I here direct notice are all natives of Eastern South Africa, and three of them appear to be undescribed, vid., *Pseudonympha pœtula*, *Lycœnesthes neglecta*, and *Zeritis Oreas*. The last-named species is a very distinct form, isolated from its known congeners by the peculiar characters indicated. Of the three species already known, one, *Acræa Admatha*, Hewits., is a native of tropical Western Africa; while the remaining two, *Acræa Obeira*, Hewits., and *Lycœna Antanossa*, Mabille, inhabit Madagascar. Both the *Acrææ* present some divergence from the typical forms.

Family NYMPHALIDÆ.

Subfamily SATYRINÆ.

Genus Pseudonympha, *Wallengren.*

Pseudonympha pœtula, n. sp.

Exp. al. (♂) 1 in. 6½—9 lin.; (♀) 1 in. 9½ lin. Nearly allied to *P. Trimenii*, Butl.*

♂. *Rather dark brown; fore wing with an undivided large deep fulvous patch occupying all central area, hind wing with a small discal ill-defined one; bipupillate subapical black ocellus of fore wing large, markedly oblique. Fore wing:* Fulvous patch extending from near base as far as subapical ocellus (which it almost half encircles), filling nearly all discoidal cell, and descending a little below part of median nervure and its first nervule; external border of patch encroaching more or less on dull yellowish grey ring of ocellus, but not sharply defined below the ocellus; upper border of patch rather sharply indented by ground colour at extremity of discoidal cell; between end of cell and ocellus an irregular dark brown thin transverse streak which usually becomes obsolescent

* Cat. Sat. Brit. Mus., p. 94, n. 6 (1868).

or obsolete inferiorly, about where it takes a strong outward deflection between 2nd and 1st median nervures; ocellus varying from large to very large, elongated obliquely, so that the lower of its two conspicuous white pupils is wholly beyond the upper; its investing ring usually rather obscure; a submarginal dark brown or fuscous streak (touched by outermost part of ring of ocellus), and also a similar hind-marginal terminal streak. *Hind wing:* Small fulvous patch beyond middle extending above 3rd and below 2nd median nervules, and bounded externally by a submarginal fuscous streak like that in fore wing; a little before this streak, between 2nd subcostal and 1st median nervules, a series of four small black ocelli, distinctly unipupillate with white, but very indistinctly ringed with dull yellowish grey; of these ocelli the uppermost is much or very much smaller than the others, and in one specimen it is wanting altogether; a terminal hind-marginal fuscous streak as in fore wing. UNDER SIDE.—*Paler throughout; neuration throughout hind wing and at apex of fore wing rather conspicuously whitish. Fore wing:* Rufous, brighter in tint; ring of ocellus better defined; apex irrorated with whitish, which also forms a line immediately before submarginal blackish streak (between that streak and ocellus); before middle, costa and both sides of inflated costal nervure edged with whitish. *Hind wing:* Of the three transverse blackish streaks, the subbasal and median ones are irregular, angulated, and strongly marked, the inner edge of the former and the outer edge of the latter being bounded by whitish clouding more or less freckled with short dark brown lineolæ, and the submarginal one is slender, slightly sinuated, and bounded inwardly throughout and outwardly in its inferior part by narrow whitish clouding; basal and inner-marginal areas more or less clouded with whitish, and more closely freckled with dark brown lineolæ than rest of wing; edge of costa near base, and a line from base to hind margin midway between submedian nervure and median nervure and its first nervule, whitish; a white fringe of hairs along inner margin and at anal angle; row of ocelli as on upper side, but consisting of five instead of four, the additional ocellus being between the subcostal nervules.

♀. Like ♂, but larger and rather paler.

(Described from five males and one female.)

This form is readily recognised by the large size and singularly oblique elongation of the ocellus of the fore wing. It further differs from its near ally, *P. Trimenii*, in the following features, *vid.*, 1o, large size; 2o, one large continuous field of rufous in the fore wings instead

of two small rather widely separated patches; 3o, better developed rufous patch and more distinct ocelli in the hind wings; and, on the under side of the hind wings, 4o, absence of the deeply bifurcate longitudinal whitish streak in the discoidal cell; 5o, much stronger dark brown (almost blackish) freckling; 6o, different direction and angulation of median transverse dark streak, which is also more strongly developed.

The South African Museum acquired a solitary ♂ of this butterfly in 1879; it was taken in the Eastern Transvaal (Lydenburg District) by Mr. T. Ayres. I did not think it advisable to found a new species on this specimen, as it might have been merely an aberration of *P. Trimenii*; but, in 1889, Mr. J. M. Hutchinson sent several examples (including one ♀) of the same form, which he had taken, in August and September, on the Natal side of the Drakensberg, at an elevation of about 7000 ft. He has since informed me that it was numerous at that height, flying rather swiftly and continuously for a Satyride; but that it was out for a very short time, not appearing after the 15th September, and was not noticed at any lower station.

Hab. Natal: Drakensberg (alt. 7000 ft.). Transvaal: Lydenberg District.

Subfamily ACRŒINÆ.

Genus Acræa, *Fab.*

Acræa Admatha, Hewits.

Acræa Admatha, Hewits., Exot. Butt., iii., p. 15, pl. 8 (*Acræa*, iii.), ff. 16, 17 (1865). [♂.]

This butterfly belongs to the *Horta* group, but is distinguished from that species and its allies by the broad dark border of the hind wings, completely enclosing six large round spots of the ground colour.

The type figured by Hewitson is noted as a native of Old Calabar, and other examples in the Hewitson Collection are recorded from Angola; while specimens from Sierra Leone and the Gold Coast are in the South African Museum and my own cabinet.

Not until 1888 was I aware that this species occurred in extra-tropical South Africa. A single ♀ example, taken at Etshowe, Zululand, in January, 1887, was then

presented to me by Capt. A. M. Goodrich, of the Inniskilling Fusiliers. Recently I have received, from Major J. S. D'Aguilar, a ♂ and a ♀ taken by him at the same station in 1886; and lastly, Mr. Cecil N. Barker has presented to the Museum a ♀ taken by him at Malvern, near D'Urban, Natal, on the 14th April, 1890.

These southern examples differ from the typical West African specimens in the form of the black spots of the hind wings, which is not nearly so rounded; the discal series of those spots is also less irregular and more continuous (the 3rd and 4th spots being nearer to the extremity of the discoidal cell), while the subbasal spot in the cell is wanting, and that immediately below it is crescentic. In the southern ♂ example, moreover, the dull brick-red of the basi-inner-marginal area of the fore wings is superiorly more extended, covering the lower half of the discoidal cell, and the discal series of indistinct fuscous spots is obsolete. This discal series of fore-wing spots is, however, present in all the three southern females.

Until more South African specimens are known, it must remain uncertain whether the differences pointed out are constant. In the females the red of the ♂ is wanting, being replaced by a dull creamy or brownish creamy tint.

Hab. Zululand: Etshowe. Natal: Malvern, near D'Urban.

Acræa Obeira, Hewits.

Acræa Obeira, Hewits., Proc. Zool. Soc. Lond., 1863, p. 65.

A. Piva, Guén., Vinson Voy. Madag., Ann., p. 34.

A. Obeira, Mab., Grandid. Hist. Phys., &c., Madag., Lep., i., p. 95, and Atl., pl. 9 A, f. 7, and pl. 10, ff. 5 and 6 (1886—87).

This is another species of the *Horta* group, and has hitherto been known from Madagascar only. Its inclusion in the South African fauna is due to my valued correspondents, Major J. S. D'Aguilar and Mr. Cecil N. Barker, the former having sent me a ♀ captured at Esthowe in Zululand, in 1886, and the latter a ♀ taken at Malvern, near D'Urban, on the 14th April, 1890.

I give the following descriptions of these specimens, *vid.*:—

♀. *Exp. al.* 2 in. 2—3 lin.

Transparent, with a dull fuscous apical and hind-marginal border in both wings; hind wing, and (more faintly) basal half of fore wing as far as extremity of discoidal cell and obliquely to posterior angle, very dull brick-red; fore wing without markings, hind wing with numerous black spots. Hind wing: A spot in cell close to base, and another about or a little beyond middle of cell; 5 subbasal spots—one costal, and four between median nervure and inner margin; two small spots, obliquely placed, marking extremity of discoidal cell; a discal superiorly strongly outward-curving series of 8 spots from costa to inner margin, the last three being considerably larger than the rest (the 3rd, 4th, and 5th spots are obsolete in the Zululand specimen); fuscous hind-marginal border ill-defined on its inner edge, the nervules and internervular lines crossing it are darker. UNDER SIDE.—Much duller and paler; red in fore wing very faint, in hind wing wanting, replaced by creamy (in Natal example tinged with dull reddish before discal series of spots). *Hind wing:* An additional black spot at base, on costa.

These South African specimens agree very well with Hewitson's brief description (*loc. cit.*) of the Madagascar type. Hewitson does not mention any small red internervular hind-marginal spots in the hind wings, nor is there any trace of these in the specimens just described; but Guenée, in his description (*op. cit.*) of *A. Piva*, mentions them, and Mabille (*op. cit.*) both describes and figures them. As regards these spots, however, it should be noted that they are evidently variable alike in colour, distinctness, and number; the figures in Grandidier's work giving six rather bright and large ones in pl. 9 A, f. 7; six rather small, faint, and inconspicuous ones in pl. 10, f. 5; and only three (between 3rd median nervule and submedian nervure) in pl. 10, f. 6.

Hab. Zululand: Etshowe. Natal: Malvern, near D'Urban. Madagascar: North and East (*Mabille*).

Family LYCÆNIDÆ.

Genus LYCÆNA, *Fab.*

Lycæna Antanossa, Mab.

Lycæna Antanossa, Mab., Bull. Soc. Ent. France, 1877, p. 101; and in Grandid., Hist. Phys. Madag., Lep., i., p. 221, and Atlas, pl. 28, ff. 11—14 (1885—87).

This *Lycæna* is one of the *Lysimon* group, and so closely allied to the Indian *L. Otis* (Fab.)—as recognised by Butler,* De Nicéville,† and other workers at Oriental Lepidoptera—that I have some hesitation in awarding it species-rank. The markings of the under side agree with those of *Otis* (Singalese specimens), but its ground colour is paler and less brownish. It is the singular silvery bluish of the upper side that best distinguishes *Antanossa*, resembling as it does the tint exhibited by the males of the European *L. Damon*, W. V., and *Corydon*, Scop., though less brilliant; for in *Otis* the blue is distinctly violaceous, as in *Lysimon*. The hind-marginal series of dark and whitish marks on the upper side of the hind wings is also a distinctive feature; and in size (*exp. al.* ♂ 11½—1 in. 0½ lin., ♀ 1 in. 0½ lin.) the insect is notably larger than *Otis*.

As long ago as March, 1867, I met with two examples of this butterfly in Natal, and recorded at the time its apparent distinctness from *L. Kuysna*, mihi (=*Lysimon*, Hübn.); but it was not until quite recently that Major D'Aguilar recalled my attention to the form by forwarding a pair from Maritzburg, and representing the apparently constant characters (notably the want on the under side of the spot in the discoidal cell of the fore wings) which separated it from *Lysimon*. Other specimens from Natal have since reached me, *vid.*: one from Mr. J. M. Hutchinson, taken at Estcourt, Weenen District, and three from Mr. A. D. Millar, taken near D'Urban.

The ♀ differs from the ♂ in being rather darker, and in the restriction of the silvery bluish of the upper side, which in one example is reduced to some indistinct scaling in basal half of fore wings, and is absent in the hind wings.

I had described this butterfly as a distinct form, not identifying it with *Antanossa*, Mab., until carefully comparing it with the excellent figures above cited.

Major D'Aguilar writes that he had taken a good many specimens in the Maritzburg District, but on the coast Mr. Millar has noticed but few. My own captures

* Cat. Fab. Diurn. Lep., p. 169, pl. ii., ff. 8, 11 (1869).

† Butt. India, &c., iii., p. 119, pl. xxvi., f. 175 (1890).

were made respectively at Udland's Mission Station and Mapumulo, in the Umooti and Lower Tugela Districts. M. Mabille states that it appears to be rare in Madagascar.

Hab. Natal: coast and inland districts. Madagascar.

Genus Lycænesthes, *Moore.*

Lycænesthes neglecta, n. sp.

Allied to *L. Liodes*, Hewits.

♂. *Exp. al.* 1 in. 0½—1½ lin.

Cupreous violaceous; a common hind-marginal linear black edging; cilia greyish white in fore wing, white in hind wing. Hind wing: In three of five examples a small indistinct hind-marginal fuscous spot between 1st and 2nd median nervules. Under side.—*Brownish grey, with a slight ochreous tinge;* in each wing a double darker streak (enclosing one of the ground colour) at extremity of discoidal cell, the whole marking being white-edged on both sides; a discal fascia, very strongly incurved inferiorly, composed of confluent spots like marking at end of cell; two submarginal rows of whitish lunules enclosing spots slightly darker than ground-colour; and a hind-marginal terminal black line, bounded inwardly by a very indistinct whitish edging. *Fore wing:* No marking before extremity of cell; discal fascia more irregular than in *Liodes, the 4th and 5th spots being three-fourths before the superior ones*, and the 6th three-fourths before the 5th (so as to be quite as near base as terminal disco-cellular spot). *Hind wing:* Discal fascia not so sharply biangulated inferiorly as in *Liodes*, its *first spot different from the rest*, fuscous, and in a complete white ring; *subcostal spot nearer base also similarly different from that in Liodes*, being quite round and black in a white ring; of three hind-marginal black spots near anal angle, the 1st and 3rd are always distinct, dusted with greenish silvery, and edged interiorly by an orange lunule; but the 2nd is indistinct, without orange lunule, and in three of five examples is obsolete.

The colour of the upper side, the browner (more ochraceous) tint of the under side, and the differences of marking italicised in the above description, distinguish this species from its near ally, *L. Liodes;* the under side markings, indeed, approximate it to the larger *L. Sylvanus* (in which, however, the hind wing has three subbasal white-ringed spots instead of one only).

I took an example of this butterfly in Natal in 1867, and in 1871 received another, captured at D'Urban by the late Mr. M. J. McKen. I regarded these as a probable "sport" of *Liodes;* but both Major D'Aguilar and Mr. C. N. Barker have recently (1889—90) sent me other examples, taken respectively at Maritzburg and Malvern, and pointed out their distinctness from the species in question; and this additional material has convinced me that the form is entitled to recognition as a species. Mr. Barker's two specimens were taken respectively on 19th January and 3rd April, 1890, the former "on *Mimosa* flowers." The female is still unknown to me.

Hab. Natal: D'Urban, Malvern (near D'Urban), and Maritzburg.

Genus Zeritis, *Boisd.*

Zeritis Oreas, n. sp.

Not nearly allied to any known species, but as regards the upper side nearer to the *Zeuxo* group.

Exp. al. (♂) 11 lin.; (♀) 1 in. 1 lin.

♂. *Submetallic golden orange, with black spots and hind-marginal border; cilia long, black, with conspicuous white interruptions at extremity of nervules. Fore wing:* Base paler on costa; two small spots before middle—one in discoidal cell, the other just below origin of 1st median nervule; a subreniform terminal disco-cellular spot; above and a little beyond last-named spot, a much smaller one, close to costa; a discal row of six rather large spots, irregular by the projection of the 3rd and 5th beyond the rest,—the 6th (below 1st median nervule) in one example divided longitudinally; costa narrowly edged with black from a little before extremity of cell to apex; hind-marginal border rather broad, especially at apex, and narrowing very gradually to posterior angle. *Hind wing:* Costal border rather broadly black; base slightly dusky; inner-marginal groove wholly dusky grey; between 1st subcostal and 1st median nervules, a discal row of 5 spots, of which the 2nd and 4th are smaller and slightly before the rest; hind-marginal border broad apically and as far as 3rd median nervule, but thence very narrow to anal angle, sharply indented throughout (but more deeply in narrow inferior portion) by the ground colour on nervules; anal angle with rather an acute projection. Under side.—*Hind wing and apex of fore wing pale dull ochreous yellow, varied with black spots and shining—almost*

silvery—white lituræ. Fore wing: Dull pale orange-yellow; black spots as on upper side, but the subbasal one below 1st median nervule expanded into a longitudinal bar from base; an additional small round spot in cell close to base, and another (more elongate) on costa above and a little before terminal disco-cellular spot; costa bordered with pale dull ochreous yellow; a regular submarginal series of six large black spots, of which the upper three are sagittiform (and the 4th subsagittiform) and bounded externally by >-shaped lituræ, shining white next spots but pale yellowish externally; extremities of these lituræ convergent at white nervular interruptions of fuscous cilia; a hind-marginal series of minute black spots, succeeded by a pre-ciliary black line interrupted on nervules; two small costal spots and first two spots of discal series bounded externally (the upper of the two latter spots also bounded internally) by a longitudinal white mark. *Hind wing:* Discal series consisting of 8 black spots slightly tinged with purplish ferruginous; from near base to discal spots run three longitudinal shining white stripes, *vid.:* between costal and subcostal nervures, —through discoidal cell,—and between median and submedian nervures; these stripes are broken by the following purplish black spots, *vid.;* the superior one by two (basal and median), the middle one by two (median and premedian), the lower one by one (median); 1st and 2nd spots of discal row bounded externally (the 2nd also internally) by elongated shining white marks; the last-named mark forms the commencement of a regular hind-marginal series of 7 >-shaped lituræ, like those in apical portion of fore wing, but longer, more acute, and bounded internally not by separate black spots, but by a continuous fuscous streak (diffuse inwardly) throughout; cilia as in fore wing, but the dark portion mixed with ochreous yellow; a hind-marginal series of black spots (rather larger and more diffuse than in fore wing), and a thin black pre-ciliary line.

♀. *Larger, paler, and duller, with less of submetallic gloss; markings as in* ♂. *Hind wing:* Lower portion of basal area before discal spots obscurer; apical portion of hind-marginal border narrower. UNDER SIDE.—Paler and duller.

This very distinct species is not nearly related to any South African congener. The upper side much resembles that of *Chrysophanus Orus* (Cram.), and also that of *Zeritis Zohra*, Donzel,* from North Africa; as regards the South African species of *Zeritis*, this surface of the wings is on the whole (though more strongly spotted,

* Ann. Soc. Ent. de France, 2me Sér., v., pl. 8, f. 5 (1847).

and with darker basal areas) more like that of the rare *Z. Chrysantas*, Trim. A singular difference between the two forms is exhibited in the cilia, the conspicuous white interruptions of which in *Oreas* are at the extremity of the nervules, while in *Chrysantas*—as well as in all others of the genus known to me in which this character occurs—they are inter-nervular. In the structural features of the antennæ and palpi, and in the shape of the wings, *Oreas* also agrees with *Chrysantas*. The under side is, as regards the hind wings, quite unique in pattern and marking, though the >-shaped hind-marginal lituræ which it (in common with the apex of the fore wings) presents remind one of the similar (but reversed and much brighter silvery) markings in the otherwise wholly different *Z. Wallengrenii*, Trim. The total absence of any steely or brassy centres in the black spots of both wings is further a highly peculiar feature in the under side of *Z. Oreas*.

The discovery of this notable addition to the genus *Zeritis* is due to Mr. J. M. Hutchinson, who thus describes how he met with the insect at an elevation of about 7000 ft. in the Drakensberg Mountains, Natal, *vid.* :—"The first specimen I saw I failed to capture, owing to my net becoming disjointed; and for a week or ten days subsequently I searched for another without success. But hurrying home to my cave from a thunderstorm, while a heavy wind was blowing, one of the new *Zeritis* was blown against my leg, and, lighting there, was soon boxed. In less than five minutes I had taken eight, including a pair *in copulâ*. The insect was very local, not occurring over more than two or three acres of ground. Its flight is near the ground, but very rapid and very suddenly interrupted. Unless one rose,—when five or six others would join in the flight,—they sat very close, and even sweeping the net over them would not make them rise. I took eighteen specimens."

Hab. Natal: Drakensberg (alt. 7000 ft.).

VII. *A Monograph of the Lycænid genus* Hypochrysops, *with descriptions of new species.* By Hamilton H. Druce, F.E.S.

[Read December 3rd, 1890.]

Plates X. & XI.

Hypochrysops.

Thecla, sect. *Hypochrysops*, Feld., Wien. Ent. Mon., iv., p. 243 (1860).
Hypochrysops, Feld., Reise Nov. Lep., ii., p. 251 (1865).
Miletus (part), Hübner, Verz. bek. Schmett., p. 71 (1816).
Miletus (part), Westw., Gen. Diurnal Lep., p. 502 (1852).
Miletus, Butler, Cat. Fabr., p. 159 (1870).

No list of the species of this beautiful genus of butterflies has been published since Mr. Kirby's Catalogue; but a few species have been described, and in the present paper I have added five more, *viz.*, four from the Solomon Islands, belonging to Messrs. Godman and Salvin, to whom my best thanks are due for their kindness in allowing me the use of their specimens, and one from Australia. Unfortunately very few of these insects have been delineated, and I find that out of the thirty-two species here enumerated, ten only have been figured; and amongst the unfigured species are five described by the late Mr. Hewitson, and now in the collection which bears his name in the British Museum. These I have had carefully drawn, and propose representing them on the plates.

Although by following certain lepidopterists, Hübner's name *Miletus* should take priority, as the first species mentioned by him is the *P. polycletus*, Linn., yet I prefer, seeing that these insects have become so well known under Felder's name, to use his name *Hypochrysops*. Again, Felder has definitely characterised the

genus, whereas Hübner placed together under his name forms that are abundantly distinct, without any remark as to which should be the type of his genus. By following this rule, Hübner's name will not be required, as the other species mentioned by him, *P. symethus*, Cr., has been taken as the type of another genus (*Gerydus*) by Boisduval, who has been followed by recent authors.

I am unable to follow Mr. de Nicèville when he states (Butt., India, Burmah, and Ceylon, iii., p. 21, 1890) :— First, that probably this genus (*Miletus*) belongs to his *Gerydus* group, as the shape of the wings of the majority of the species and the normal legs would appear to point to a close relationship to his *Poritia* group; secondly, when he states that the genus *Hypochrysops*, as distinct from *Miletus*, includes very different insects. Now by comparing the legs, palpi, and arrangement of the nervules of the two types, it will be found that there is no appreciable difference, and I can detect no characters whereby to satisfactorily separate the following species into distinct genera. But, for the sake of convenience, I have divided the species into the three following groups, *viz.* :—

Group I.—Costa of fore wings arched; 1st and 2nd median nervules of hind wing produced, so as to form blunt tails.

Group II.—Apex of fore wing pointed; hind wing more produced at anal angle than at apex.

Group III.—Costa of fore wing arched; hind wing more produced at apex than at anal angle.

It is true, however, that in group II. the 3rd branch of the subcostal nervure is emitted slightly higher up, and that the lower median nervule is rather more curved outwardly than in groups I. and III.; but these slight differences are, in my opinion, insufficient for generic distinction.

The curious crease between the lower median nervule and the submedian nervure, which is found in many genera of the *Lycænidæ*, is particularly well developed in some species of this genus, notably *H. eucletus* and *H. anacletus*, giving them almost the appearance of having an additional nervure.

The butterflies of this genus inhabit the Indo-Australian region, principally New Guinea and the adjacent islands,

and individually seem to have a very limited range, extending northwards to Gilolo, southwards to New South Wales, eastwards to the Solomon Islands, and westwards to Nias Island, W. Sumatra; no species, however, being recorded between that island and the Island of Timor.

The majority of the species are exceedingly difficult to procure, and very few collections contain a representative series.

The following Table will show at a glance the localities of the species at present described, but there are, doubtless, many new forms yet to be received.

	Gilolo	Waigiou	Kaióa	Batchian	Ceram	Amboina	Saparua	Aru Islands	New Guinea	New Britain	Guadalcanar I. Solomon Is.	Maleita Island Solomon Is.	Fauro Island Solomon Is.	Timor	Thursday I.	N. Australia	Queensland	N. S. Wales	W. Australia	Nias Island, W. Sumatra
Hypochrysops																				
polycletus ..				+	+	+	+							+						
hypocletus ..		+							+											
rex									+											
epicletus								+												
rovena																+	+	+		
halyætus ..																			+	
dicomas		+																		
ignita																	+	+	+	
epicurus																	+			
delicia																		+		
apelles								+	+						+	+	+		+	
chrysanthis .						+														
hypates			+																	
hecalius																		+		
cœlisparsus .										+										+
eucletus	+							+	+						+					
narcissus ..																+				
livius																+ ?				
protogenes ..		+							+											
pythias		+							+											
anacletus ..					+	+	+													
zeuxis	+																			
scintillans ..										+										
cratevas											+									
architas													+							
seuthes												+								
arronica		+						+												
alyattes ..											+									
doleschalli ..					+	+														
theon	+							+	+											
herdonius ..								+												
hippuris ..								+												

Group I.

Hypochrysops polycletus. (Pl. XI., fig. 15, harpago).

Papilio polycletus, Linn., S. N. I., p. 485, n. 166 (1758); Mus. Ulr., p. 336, 1764; S. N. I., 2, p. 795, No. 265 (1767).

P. polycletes, Clerck, Icones, t. 17, f. 2 (1764); *P. polycletes*, Cram., Pap. Ex., II., t. 159, F. G. (1779); Fabr., Syst. Ent., p. 534 (1775).

Polyommatus polycletus, Godt., Enc. Méth., ix., p. 661, no. 151 (1823).

Miletus polycletus, Butl., Cat. Fabr. Lep., p. 159 (1870).

Hypochrysops polycletus, Kirby, Synon. Cat., p. 378 (1871).

H. polycletus, Pagenst., Lep. Fauna Amboina, p. 48 (1884); Schmett. Amboina, p. 12 (1888).

H. polycletus, Staugr., Exot. Schmett., pl. xciv. (1888).

H. polycletus, Ribbe, Deutsch. Entom. Zeitschr., p. 254, n. 117 (1890).

♂, *Papilio epopus*, Cram., Pap. Ex., iv., t. 363, G. H. (1782).

Hab. Batchian (Stgr.), Mus. G. & S.; Timor, B. M. (?); Ceram (Wallace & Ribbe), Mus. G. & S., B. M., Hew. Coll.; Amboyna, Mus. G. & S., D., B. M., Hew. Coll.; Saparua, Mus. Crowley.

There is a ♂ specimen in the British Museum from Timor, and another in the Hewitson Collection, labelled "Batchian," in which the black marginal borders are about three times as wide as in typical specimens. These may possibly belong to a distinct species. The under sides, however, do not seem to differ from those of *H. polycletus*. It may be named *atromarginata*, var. or species. In the Hewitson Collection in the British Museum, under the name *polycletus*, are placed specimens of *H. rex*, Boisd., from New Guinea; *H. polycletus*, Linn., from Ceram and Amboyna, the broad-bordered form referred to above; and a single ♀ specimen of *H. hypocletus*, Oberth., from New Guinea.

Hypochrysops hypocletus. (Pl. X., fig. 1).

Hypochrysops hypocletus, Oberthür, Ann. Mus. Genov., xv., p. 521, 1880.

♂. Upper side rich purple-blue. Allied to *H. polycletus*, Linn., from which it differs on the under side by the absence of all red

markings on the fore wing, except at the base, and also by the inner marginal area being greyish white. The red spots on the costal half of hind wings are broadly bordered with black, and on the anal half have almost entirely disappeared (in some specimens), and are replaced by black; the ground colour of both wings being a much blacker colour.

♀. Allied to *H. polycletus*, but with the white fascia extending over the whole of the cell. Under side: Fore wing with the white fascia much more extensive, and reaching close to the base. Hind wing as ♂. Head, thorax, abdomen, and legs as in *H. polycletus*, but the antennæ much less distinctly annulated with white.

Hab. Waigiou (Wallace, Platen), Mus., G. & S., B. M., Oberth.; New Guinea; Andai, Salvatti (A. A. Bruijn), Mus. G. & S., Oberth.

This species, which has been confounded with the preceding, is abundantly distinct, the whitish inner-marginal area of the under side of the fore wing of ♂, which makes the sexes appear much alike, easily separating them; and in a good series of specimens I can detect no variation. M. Oberthür, in his description (as a possible variety), compares it with *H. epicletus* (*H. rex*), but it seems to me more nearly allied to the Linnean species, *H. polycletus*.

Hypochrysops rex. (Pl. X., figs. 2, 3).

Simæthus rex, Boisd., Voy. Astr. Lep., p. 72 (1832). ♀.
Miletus rex, Westw., Gen. D. Lep., p. 502 (1852) (!).
M. rex, Kirby, Synon. Cat., p. 336, No. 4 (1871).
M. epicletus, Butler, Ann. Nat. Hist. (4), xviii., p. 244 (1876).
Hypochrysops epicletus, Kirsch, M. T., Mus. Dresd., i., p. 127 (1877).
H. epicletus, Oberthür, Ann. Mus. Genov., xv., p. 521 (1880).

Hab. New Guinea, Port Moresby (Goldie & Mathew), Mus., G. & S., D.; Geelvink Bay (H. O. Forbes), Mus. D.; Central New Guinea (D'Albertis), Mus. G. & S.; Kordo, Rubi; Wawiji (Kirsch); S. New Guinea (Oberth.); Offack, Dorey (Boisd.); Dinner I. (H. O. Forbes), Mus. D.

This species is to be found in most collections, and, next to *H. polycletus*, Linn., is perhaps the best known in the genus, but was apparently only known from the

description of the type for a considerable time, which caused it to be doubtfully placed in *Miletus* by Westwood in 1852, and by Kirby as late as 1871.

A ♂ from Geelvink Bay, N. W. New Guinea, has almost entirely lost the red in the cell of the fore wing below, and the metallic-green spots are generally smaller.

There can be no doubt that Kirsch has redescribed the ♀ of *H. rex*.

Hypochrysops epicletus.

Thecla epicletus, Felder, Wien. Ent. Mon., iii., p. 324, n. 25, t. 6, f. 3 (1859).

Hypochrysops epicletus, Kirby, Synon. Cat., p. 378 (1871).

H. epicletus, Ribbe, Iris, iii., p. 85 (1886).

Hab. Aru Is. (Wallace, Ribbe), Mus. G. & S., B. M.

This species is closely allied to the preceding, from which it is very difficult to distinguish it; and it is probable that when Felder described it he was unacquainted with the ♂ of Boisduval's species, at least he does not mention it in his description, but refers to *H. polycletus*, Linn.

It can, perhaps, be distinguished by the somewhat greater extent of black at the anal angle, and by the fascia on the fore wing of ♀ being purer white, and rather blunter at its outer extremity.

Hypochrysops rovena, sp. n.

Allied to *H. rex*, Boisd., but smaller.

♂. The black margins rather broader generally, notably on the costal margin of hind wing, where it extends almost down to the lower branch of the subcostal nervure, and also at the anal angle. Under side: Ground colour considerably lighter, and with a portion near the apex of the hind wing distinctly lighter than the general surface.

♀. Similar to *H. rex*, ♀, but suffused at the base with light blue in place of green. Under side as the ♂ (hind wing).

Hab. N. Australia; Cape Bowen, Mus. G. & S.; Richmond River, Mus. Crowley; Queensland, Mus. D.; Cape York; Port Macquaire, B. M.

This species, which has long been in collections (generally under the name *rex*), is distinguished from the New Guinea form by the different ♀, and by the light patch on the under side of the hind wings, as noted above.

Group II.

Hypochrysops halycætus. (Pl. X., figs. 4, 5).

Hypochrysops halycætus, Hew., Trans. Ent. Soc., 1874, p. 350.

♂. Wings above brilliant cærulean-blue, with the apical thirds brownish black; posterior wing with a submarginal orange band. Under side orange-yellow, with large metallic green spots along the costa and at apex of fore wing. Hind wing with three distinct wide bands of metallic-green, the outer being composed of large oblong spots.

♀. As above, but lilac-blue, and with a linear orange outer margin to both wings. Expanse, $1\frac{3}{10}$ in.

Hab. W. Australia (Swan River, Hew.), Mus. G. & S., Hew. Coll.

This species, which is not allied to any other, appears to be a scarce one, as the only specimens I have come across are four in the Hewitson Collection, and one in Messrs. Godman and Salvin's possession.

Hypochrysops dicomas.

Hypochrysops dicomas, Hew., Trans. Ent. Soc., 1874, p. 350.

Hab. Waigiou (Wallace), Hew. Coll.

The only example of this curious little species which I have seen is the type, which is stated to be a ♂. It is dull brown on the upper side, and more rufous-brown, with metallic bluish spots and lines, on the under side. It bears a superficial resemblance to some butterflies of the family *Erycinidæ*, viz., *Anteros acanthus*, Cr., and *A. acanthoides*, Herr-Schäff., but without the tails.

Hypochrysops ignita.

Lycæna ignita, Leach, Zool. Misc., i., p. 136, t. 60, f. 1–3 (1814).

Cupido ignita, Kirby, Syst. Cat., p. 376 (1871).

Hypochrysops ignita, Kirby, Syst. Cat., p. 773 (1877).

Hab. Australia; King George's Sound; Moreton Bay, B. M.; Victoria, Mus. G. & S.; Port Denison, Hew. Coll.

This species, which is in most collections, varies somewhat in the width of the black border; also in the

extent of the yellow on the costa, apex and nervules of the fore wings, and on the nervules of the hind wings; the specimen, noted above, from Victoria being almost entirely yellow in these parts.

Hypochrysops epicurus.

Hypochrysops epicurus, Miskin, Trans. Ent. Soc., 1876, p. 455.

Upper side uniform shining brown, with violet reflections. Under side pale shining brown, with linear markings of brassy green.

Hab. Australia; Brisbane (Miskin); Moreton Bay, Hew. Coll.

Two specimens, in Hew. Coll., are the only two I have seen. As stated by Miskin, this species is allied to *H. ignita*, Leach, but is a much duller coloured insect.

Hypochrysops delicia. (Pl. X., figs. 6, 7).

Hypochrysops delicia, Hew., Ent. Monthly Mag. xii., p. 38 (1875).

Hab. Australia (Hew.); New South Wales, Hew. Coll.; Moreton Bay, B. M.

This species, which on the upper side is a brilliant bluish green bordered with black, much resembles *H. ignita*, Leach, on the under side, but is, however, a much larger insect. It was described by Hewitson, from a specimen in the possession of Mr. Henley Grose Smith.

The only other specimens I have seen are a ♂ in the Hewitson Collection and a ♀ in the British Museum.

Hypochrysops apelles.

Papilio apelles, Fabr., Syst. Ent., p. 524, n. 342 (1775).
P. apelles, Don., Ins. New Holland, t. 30, f. 2 (1805).
Miletus apelles, Butl., Cat. Fab., p. 159 (1870).
Hypochrysops apelles, Kirby, Syst. Cat., p. 378, n. 7 (1871).
H. apelles, Mathew, P. Linn. Soc. N. S. W., 1885, p. 265.
H. apelles, Ribbe, Iris, iii., p. 85 (1886).
H. apelles, Staud., Exot. Schmett., pl. xciv. (1888).

Hab. Queensland; N. Australia (Macleay); W. Australia, Mus. G. & S.; Thursday Island (Mathew), Mus., Druce; Aru Islands (Ribbe); Champion Bay; Dorey, B. M., Hew. Coll.

This species, which varies considerably in size (the specimen from Dorey, a ♀, being 1¼ in.), is apparently fairly plentiful, and is in most collections in this country.

The type specimen is in the Banksian collection in the British Museum.

Hypochrysops chrysanthis.

Thecla chrysanthis, Feld., Sitzb. Ak. Wiss. Wien. Math. Nat. Cl., xl., p. 455, n. 26 (1860).

Hypochrysops chrysanthis, Feld., Reise Nov. Lep., ii., p. 256, n. 302, t. 32, f. 1, 2 (1865).

H. chrysanthis, Pagenst., Schmett. Amboina, p. 12 (1888).

Hab. Amboyna (Dr. Doleschall), Mus., F.

This fine species is not in any collections that I have been able to examine, and is known to me only by Dr. Felder's figure.

The description is taken from a ♀.

Hypochrysops hypates. (Pl. X., figs. 8, 9).

Hypochrysops hypates, Hew., Trans. Ent. Soc., 1874, p. 351.

Hab. Kaióa (Wallace), Hew.

This species, of which the only specimen known to me is the type, a ♀, in the Hewitson Collection in the British Museum, is brown, with broad black margins on the upper side, and on the under side approaches somewhat to that of *H. eucletus*, Feld.

Hypochrysops hecalius.

Hypochrysops hecalius, Miskin, Trans. Ent. Soc., 1884, p. 94.

Hab. Victoria (Kershaw), Mus. Miskin.

This species—which is dark brown with a central patch of orange on each wing on the upper side, and chrome-yellow with transverse bands and patches edged with black and metallic blue on the under side—is known to me only from the description, and is not represented in any collections that I have been able to examine. It appears to be allied to *H. hypates*, Hew.

Miskin describes a ♀. Expanse, 1½ in.

Hypochrysops cœlisparsus. (Pl. X., figs. 10, 11).

Miletus cœlisparsus, Butl., Ann. Nat. Hist. (5), xii., p. 159 (1883).

Hypochrysops cœlisparsus, Kheil, Rhop. Ins. Nias, p. 30 (1884).

Hab. Nias Island (W. Sumatra), B. M.

The type of this species is in the British Museum. It is orange-yellow bordered with black above, whilst the under side somewhat resembles that of *H. eucletus*. The discovery of this species brings our knowledge of the distribution of the genus some 2000 miles further westward, as formerly *H. polycletus*, from Timor, was the limit in that direction; and it is curious that no species have been recorded from the various intervening localities at which butterflies have been collected.

The figure is taken from the type specimen in the British Museum.

Hypochrysops eucletus. (Pl. X., figs. 12, 13).

Hypochrysops eucletus, Felder, Reise Nov. Lep., ii., p. 253, n. 299 (1865).

H. eucletus, Oberthür, Ann. Mus. Genov., xv., p. 521 (1880).

H. eucletus, Ribbe, Iris, iii., p. 85 (1886).

Hab. Gilolo (Feld.); Port Moresby, New Guinea (Goldie), Mus. G. & S.; Port Moresby (Mathew), Mus. D.; Thursday Island (Mathew); Aru Islands, B. M.; New Guinea, B. M.; Soron, New Guinea (D'Albertis), Mus. Crowley; Waigiou (Oberth.). In three females we have from Thursday Island, the blue on the upper surface of wings is extended over a greater area than in any specimens I have seen from New Guinea.

The ♂ of this species differs from the ♀ in the much more brilliant though less extensive blue of the upper side, and by the yellow ground colour on the under side of the hind wings being more or less suffused with dark purplish brown.

I have never seen a specimen from Gilolo, but the New Guinea insect appears to fit the description, and is generally considered identical.

Hypochrysops narcissus.

Papilio narcissus, Fabr., Syst. Ent., p. 524, no. 342 (1775).
P. narcissus, Don., Ins. New Holland, t. 30, f. 3 (1805).
Miletus narcissus, Butl., Cat. Fabr., p. 159 (1870).

Hab. Australia.

This species is closely allied to the preceding, but the blue on the upper surface of the hind wing is more extensive and of a much lighter hue; the ground colour of the hind wing below is considerably blacker, and the yellow, which is so distinct on *H. eucletus*, has almost entirely disappeared. The type specimen, a ♂, which is in the Banksian Collection in the British Museum, is the only specimen I have seen.

Hypochrysops livius.

Hesperia livius, Fabr., Ent. Syst., iii., p. 315 (1793).[1]
Papilio livius, Don., Ins. India, t. 46, f. 4 (1800).[2]
P. livius, Westw., Don., Ins. India, t.
Miletus livius, Butler, Cat. Fabr., p. 159 (1870).

Hab. "In Indiis,"[1 2]; Australia (?).

Mr. Kirby, in his Catalogue, gives Amboyna as a possible locality.

There is a specimen in the Oxford Museum, which I believe to belong to this species. It is labelled, "Australia."

Hypochrysops protogenes. (Pl X., figs. 14, 15).

Hypochrysops protogenes, Feld., Reise Nov. Lep., ii., p. 255 (1865).
Miletus protogenes, Butler, Ann. Mag. Nat. Hist. (4), xviii., p. 249 (1876).
Hypochrysops protogenes, J. Kirsch, M. T. Mus. Dresd., i., p. 127 (1877).

Hab. Waigiou (Wallace); Mus. Feld., Hew. Coll.; New Guinea, Port Moresby; Ansus.

In a ♂, in the Hewitson Collection, the upper side is dark purple-blue, narrowly bordered with black, which is rather broader at the apex, and much resembling the same sex of the following species. The under side is the same as the ♀.

Hypochrysops pythias. (Pl. XI., fig. 1).

Hypochrysops pythias, Feld., Reise Nov. Lep., ii., p. 254 (1865).

Hab. Waigiou (Wallace), Mus. Feld., B. M., Hew., G. & S.; New Guinea, B. M., ♂.

The ♂ on the upper side is a uniform dark purple, darker in the cell, and with scarcely any black margins.

This species would seem to afford good evidence to prove that these insects cannot be divided into distinct genera, as on the upper side it resembles *H. anacletus*, Feld., and allies; and on the under side, *H. polycletus*, Linn.

Hypochrysops anacletus.

Thecla anacletus, Feld., Sitzb. Ak. Wiss. Wien. Math. Nat. Cl., xl., p. 454, n. 25 (1860).

Hypochrysops anacletus, Feld., Reise Nov. Lep., ii., p. 252, n. 298, t. 32, f. 3-5 (1865).

H. anacletus, Mathew, P. Linn. Soc. N. S. W., 1885, p. 265.

H. anacletus, Pagens., Lep.-Fauna Amboina, p. 48 (1884); Schmett. Amboina, p. 12 (1888).

H. anacletus, Ribbe, Deutsche Entom. Zeitschr., p. 253 (1890).

Hab. Amboyna; Ceram; B. M., Mus. G. S., Hew. Coll.; Saparua, Mus. Crowley.

This species, which is represented in most collections, is the largest and most robust looking of the group.

Hypochrysops zeuxis.

Hypochrysops zeuxis, Stgr., Exot. Schmett., p. 273, pl. xciv. (1888).

Hab. Gilolo.

This species, which is stated by Ribbe (Deutsche Ent. Zeitschr., p. 254, 1890) to be a local form of *H. anacletus*, seems to differ from that species by the much greater surface of blue above, and by the bands on the under side of the hind wing being black in place of brick red.

It is only known to me by Dr. Staudinger's figure.

Hypochrysops scintillans.

Miletus scintillans, Butl., Ann. Nat. Hist. (5), x., p. 149, 1882.

Hab. New Britain.

This species is allied to *H. anacletus*, but is of a lighter blue above, and the red bands below are larger and of a more fiery red colour.

The type specimen is in the British Museum.

Hypochrysops cratevas, sp. n. (Pl. X., figs. 16–18; Pl. XI., fig. 16, harpago).

"*Hypochrysops cratevas.*

Alis supra læte saturate cyaneis undique nigro circumcinctis, anticis apice late nigris: subtus ochraceis, anticis area interna grisescente, lineis tribus longitudinalibus notatis una costali altera inter venas costalem et subcostalem tertia per cellulæ medium, maculis quatuor subcostalibus, lineis duabus transversis ultra cellulam et maculis quinque submarginalibus nitide æneis, omnibus nigro limbatis, fascia interrupta discali rufescente, nigro marginata; posticis linea costali et lineis quinque transversis quarum prima et secunda conjunctis quarta et quinta eodem modo conjunctis omnibus nigro marginatis, fascia discali (ad angulum apicalem interrupta) nigro extrorsum marginata, ultra eam fascia altera rufescente-grisea nigro extrorsum limbata, fascia submarginali maculosa ænea nigro extrorsum marginata.

♀. Alis fuscis ad basin cæruleo limbatis, anticis dimidio costali nigricante macula discali lilacino tincta subtus mari similis.

Hab. Solomon Islands; Aola in Guadalcanar (C. M. Woodford), Mus., G. & S.

The nearest ally to this species appears to be *H. anacletus* of Felder, from Ceram and Amboyna; besides slight differences in the markings of the under surface, the blue of the upper surface is of a much deeper tint.

Mr. Woodford obtained many specimens of this species, all from the Island of Guadalcanar."—Salvin, MS.

Hypochrysops architas, n. sp. (Pl. XI., figs. 2, 3).

"*Hypochrysops architas.*

Præcedenti similis, sed posticarum fasciis transversis æneis distinctis haud conjunctis, et area inter primam et secundam tertiam et quartam ferruginea distinguendus.

Hab. Solomon Islands; Fauro Island (C. M. Woodford), Mus. G. & S.

Of this species, Mr. Woodford obtained only a single specimen; but as it differs both in pattern and coloration from the allied form in Guadalcanar, we do not hesitate to describe it."—Salvin, MS.

Hypochrysops seuthes, sp. n. (Pl. XI., figs. 4, 5).

"*Hypochrysops seuthes.*

♀. Alis fuscis, anticis ad basin cæruleo lavatis et plaga subtriangulari discali alba notatis, posticis pallidioribus; subtus anticis fere ut in *H. cratevas* sed area interna albicantiore, posticis dimidio proximo ochraceo undique lineis cæruleo-argenteis nigro marginatis vermiculato maculis irregularibus ferrugineis ultra cellulam, dimidio distali albicante margine externo late rufescente-ochraceo introrsum nigro limbato et linea submarginali cæruleo-argenteo includente.

Hab. Solomon Islands; Uru Bay and Tyoh in Maleita Island (C. M. Woodford), Mus. G. & S.

Mr. Woodford's collection contains two females of this distinct species, which is not closely allied to any of the foregoing, but comes perhaps nearer to *H. cratevas* and *H. architas* rather than to *H. alyattes;* but, like the latter species, there is a good deal of white colouring on the under surface of the wings."—Salvin, MS.

Hypochrysops arronica.

Thecla arronica, Feld., Wien., Ent. Mon., iii., p. 323, n. 24, t. 6, f. 4 (1859).

Hypochrysops arronica, Kirby, Syst. Cat., p. 378 (1871).

H. arronica, Ribbe, Iris, 3, p. 85 (1886).

Hab. Aru Islands (Wammo Dobbo, Ureiuning) (C. Ribbe), Mus. G. S., B. M., Hew. Coll.; Waigiou, ♀, Mus. G. S.

It is, perhaps, possible that the ♀ in Messrs. Godman & Salvin's collection is incorrectly labelled, "Waigiou." It is not recorded from the intervening islands, Ceram, Amboyna, or New Guinea.

Hypochrysops alyattes, sp. n. (Pl. XI., figs. 6—8).

"*Hypochrysops alyattes.*

Alis supra nitide cyaneis undique nigro limbatis: subtus albis, anticis costa (cellulam includente) margine externo et linea transversa discali a costa ad angulum analem nigricantibus, costa et margine externo ipsis ferrugineo tinctis lineis tribus longitudinalibus altera transversa discali maculis quoque sex submarginalibus nitide argenteo cæruleis; posticis basi lineis transversis duabus confluentibus nigris cæruleo-argenteo limbatis, linea submarginali nigra extrorsum cæruleo-argenteo marginata margine ipso ferrugineo.

♀. Alis fuscis cæruleo ad basin lavatis anticis macula discali albida, posticis pallidioribus.

Hab. Solomon Islands; Aola, in Guadalcanar (C. M. Woodford), Mus. G. & S.

Mr. Woodford obtained a few specimens of both sexes of this beautiful species, all in the Island of Guadalcanar, where it is found in company with *H. cratevas*, but is apparently a much scarcer insect.

It is probably most nearly allied to *H. doleschalli* of Felder, but has many points of distinction."—Salvin, MS.

Hypochrysops doleschalli.

Thecla doleschalli, Feld., Sitzb. Ak. Wiss. Wien. Math. Nat. Cl., xl., p. 454, No. 24 (1860).

Hypochrysops doleschalli, Feld., Reise Nov. Lep., ii., p. 251, n. 296, t. 32, f. 67 (1865).

H. doleschallii, Pagens., Schmett. Amboina, p. 12 (1888).

Hab. Amboyna, Ceram; Hew. Coll.

The only representatives I have seen of this species are two specimens (♂ ♀) in the Hewitson collection.

Group III.

Hypochrysops theon. (Pl. XI., figs. 9, 10).

Hypochrysops theon, Feld., Reise Nov. Lep., ii., p. 252, n. 297 (1865).

H. theon, Ribbe, Iris, iii., p. 85 (1886).

Hab. Gilolo (Felder); New Guinea, Hew. Coll.; Aru Islands, B. M., Hew. Coll.; Ureiuning (C. Ribbe), Mus. G. & S.

The ♀ of this insect is rather larger than the ♂, and the upper side of a dull black colour, with the internal area of the fore wing yellowish white, with a few blue scales along the superior wall of the cell. The hind wing is dull black, with the costal margin pure white, as in the ♂. Under side same as ♂.

Although this species has a somewhat extended range, it is a rare insect, and seldom met with in collections.

Hypochrysops herdonius. (Pl. XI., figs. 13, 14).

Hypochrysops herdonius, Hew., Trans. Ent. Soc., 1874, p. 352.

Hab. Aru Islands (Wallace).

The only specimens I have seen of this beautiful insect are the types in the Hewitson Collection in the British Museum. Herr C. Ribbe has not recorded the species in his "Lepidopteren-Fauna der Aru-Inseln," 'Iris,' iii., 1886.

Hypochrysops hippuris. (Pl. XI., figs. 11, 12).

Hypochrysops hippuris, Hew., Trans. Ent. Soc., 1874, p. 351.

Hab. Aru Islands (Wallace).

This species, again, is only known to me by the type in the Hewitson Collection, and is also not recorded by Herr C. Ribbe.

These last two species bear a superficial resemblance to the group which includes the *Papilio danis*, Cr., from Amboyna.

The following species have been described under *Hypochrysops*, and referred to other genera by recent authors, viz., *H. elegans*, Druce, and *H. bubases*, Hew., to *Catapœcilma*, by Mr. Butler and others.

The *Ilerda* (?) *superba*, Druce, placed in *Hypochrysops* in the Hewitson Collection, has been made the type of a new genus (*Semanga*) by Mr. Distant.

The letters "G. & S." refer to specimens in Messrs. Godman & Salvin's collection; "D." to specimens in our own possession; and "B. M." to those in the British Museum.

Explanation of Plates X. & XI.

PLATE X.

Fig. 1. *Hypochrysops hypocletus* ♂, under side.
2. ,, *rex* ♂.
3. ,, *rex* ♀.
4. ,, *halycætus* ♂.
5. ,, ,, ♂, under side.
6. ,, *delicia* ♂.
7. ,, ,, ♂, under side.
8. ,, *hypates* ♀.
9. ,, ,, ♀, under side.
10. ,, *cœlisparsus* ♀.
11. ,, ,, ♀, under side.
12. ,, *eucletus* ♂.
13. ,, ,, ♂, under side.
14. ,, *protogenes* ♂.
15. ,, ,, ♂, under side.
16. ,, *cratevas* ♂.
17. ,, ,, ♀.
18. ,, ,, ♀, under side.

PLATE XI.

Fig. 1. *Hypochrysops pythias* ♀, under side.
2. ,, *architas* ♀.
3. ,, ,, ♀, under side.
4. ,, *seuthes* ♀.
5. ,, ,, ♀, under side.
6. ,, *alyattes* ♂.
7. ,, ,, ♀.
8. ,, ,, ♀, under side.
9. ,, *theon* ♂.
10. ,, ,, ♂, under side.
11. ,, *hippuris* ♂.
12. ,, ,, ♂, under side.
13. ,, *herdonius* ♂.
14. ,, ,, ♂, under side.
15. ,, *polycletus* (harpago).
16. ,, *cratevas* (harpago).

VIII. *Notes on the Lepidoptera collected in Madeira by the late* T. Vernon Wollaston. By George T. Baker, F.L.S.

[Read December 3rd, 1890.]

Plate XII.

In the early part of the present year I was much interested to see Mrs. Wollaston's collection of Madeiran insects, comprising both those taken by herself as also many taken in earlier years by her much lamented husband. When making another call on my friend at Teignmouth, I was very gratified by her generous offer to place nearly all the collection at my disposal, and thus save to science a record that would otherwise have perished. At present but little is known of the Lepidoptera of these islands, as also of the Cape de Verdes and the Canaries, though the latter have recently been attracting more attention; but for years nothing has been written about the Madeiras. It appears to me, therefore, that this may be a fitting opportunity, after describing and cataloguing the species before me, to collate and tabulate all that is known of the insects of the Atlantic Islands, in so far as it may be possible to do so.

The literature on the Lepidoptera of Madeira may be said to be comprised in two papers, both published in the 'Annals and Magazine of Natural History,' *viz.*, the first, by the late T. V. Wollaston, "Brief diagnostic characters of undescribed Madeiran Insects," 3rd series, vol. i.; and the other by Mr. Stainton, "Notes on Lepidoptera collected in Madeira by T. V. Wollaston, Esq., with descriptions of some new species," 3rd series, vol. iii., p. 209. These appear to have been entirely overlooked by the majority of continental entomologists; even Dr. Staudinger did not know of them until a very few years ago. Mr. Stainton's paper, being easy of access, will only be referred to occasionally, as we come to the insects therein described; but Mr. Wollaston's

paper, though of equal accessibility, consists almost entirely of short Latin descriptions of the various species mentioned (as its title implies), and I therefore propose to transcribe these, and add thereto another careful description in English, where possible, from his types, but otherwise from specimens in my possession. It will be seen from what follows that there is a tendency to considerable variation among the individual species, generally in the direction of melanism. Various theories have been broached to account for melanic variation, but in this instance temperature, *i. e.*, lowness of temperature, cannot be the cause; the probability is that humidity of climate (another of the more recent propositions) may have been a potent factor therein.

Passing on now to catalogue the collection, and following the general order of Staudinger's list, the first insect is

Pieris brassicæ var. *Wollastoni*.

Of this insect there is a considerable series, which, I think, will prove it worthy of its varietal name. It is, moreover, an interesting instance of insular deviation from the original type. In the deepening and enlargement of the black spots on the fore wings it forms a transition between *brassicæ* and the Canary form *cheiranthi*, whilst in the greener colour of the under surface of the hind wings it recedes in the contrary direction. The upper side of the ♂ is practically indistinguishable from *brassicæ*, but on the under side the two black spots are larger and often connected by a dark scaling, making them almost appear to be one large patch. There is, however, a greater difference in hind wings and the apical area, which in *brassicæ* are of a yellowish grey hue, whilst in this variety the colour is greenish grey, the distinction being caused to some extent by the darker grey irrorations of v. *Wollastoni*. From *cheiranthi* the Madeira form differs also chiefly on the under surface, the former of which can be recognised at once by the broad black band of the upper wings (formed by the coalescence of the two black spots), and also by the deep yellowish buff of the secondaries.

The ♀ sex from Madeira shows some little variation. All are much darker than the parent species, but none

so dark as the Canary form. Nevertheless, the darker forms approach *cheiranthi* more nearly than the paler ones do *brassicæ*. The two spots on the fore wings are quite twice as large as in the latter, each being extended over the two veins and joined together in the centre by a black dusting; the black dash on the inner margin is likewise larger, and joined to the lower spot. They never, however, form the broad band, which makes *cheiranthi* so conspicuous and handsome an insect. The dark apical area is usually as large and as dark as in that species. The yellowish hue of the secondaries not infrequently extends to the fore wings also, a circumstance I have never noticed in the Canary form. The colour of the hind wings is occasionally quite as deep as the paler specimens of *cheiranthi*, but, as a rule, they (the hind wings) are paler, and the black marginal spot is never as large. On the under surface the spots are always decidedly larger than in *brassicæ*, but never joined, *i. e.*, in the fifty specimens before me, as they are in *cheiranthi*, whilst the colour of the apical area and secondaries is always greener and greyer than in our common species, thus deviating in exactly the opposite direction from *cheiranthi*, which is usually of such a handsome deep yellowish buff. It is clear from the foregoing that we have here a distinct transitional form from *brassicæ* to *cheiranthi*, without having to go so far as India for it. I may mention also that my largest Madeira specimens are not so large as the smallest Canary one I have.

Colias edusa, F., and var. *helice*, Hb.

Common, and similar to the European form, some being, however, unusually large.

Rhodocera cleopatra var. *maderensis*, Feld. (Pl. XII., figs. 1, 1 *a*).

This also is common in Madeira, and is interesting, inasmuch as it forms a connecting link between the ordinary Mediterranean form and that found in the Canaries, viz., *cleobule*, Hb. The Madeira ♂ specimens have the whole of the fore wings deep reddish orange colour, with only the narrowest border of yellow at the apex and hind margin, and the hind wings are also of a somewhat deeper hue. The under surface is likewise of

a deeper and more uniform yellow, whilst the central spots are much darker; there are also present, about midway between them and the posterior margin, a row of small dark dots, extending half across the fore wing from the costa, and all round the hind wing.

In the ♀ the difference is less marked, the colour being slightly deeper than in the ordinary form, this being more apparent in the secondaries; the central spots are also decidedly larger and brighter, whilst the extreme margins, both costal and posterior, are finely edged with deep orange. The same differences apply as to the under surface, and there are also generally present the rows of small dark spots, already mentioned in the ♂.

The Canary form of both sexes is deeper in colour, and the orange extends right fully up to the posterior margin.

Polyommatus phleas, L.

Common. The usual form of this species is very dark, both the wings being suffused all over with very dark scales. I have one or two paler specimens, but they are evidently rare, the ordinary ones being certainly darker than v. *eleus*. I have before me specimens from almost every country where it obtains, but, with the single exception of one extraordinary and almost black *eleus* from Broussa (Asia Minor), none are as dark as the Madeira insects.

Lycæna bœtica, L.

Common, and does not differ from the usual European type.

Vanessa atalanta, L.

I have but three specimens labelled, by Mr. Wollaston, "the Mount," showing that it and *callirhoë* inhabit precisely the same area. These three do not deviate from the ordinary form.

Vanessa callirhoë, F.

Mrs. Wollaston tells me that this is abundant at low and intermediate elevations. All the specimens before me are smaller and darker than my Amoor examples; the white spots are much smaller, and all the coloured

markings reduced somewhat. Mr. Wollaston says, "Porto Santo specimens are permanently smaller than in Madeira proper" ('Variation of Species,' p. 74).

Mr. Leech tells me that Canary specimens are quite as large as those from the East.

Herr S. Alpheraky writes, in vol. v. of 'Romanoff's Memoires,' p. 218, "In spite of the opinion of lepidopterists, I cannot recognise in this species anything else than a variety of our European *atalanta;*" and he goes on to base his arguments mainly on the fact that Mr. J. H. Leech reared five *atalanta* out of several hundred larvæ supposed to be *callirhoë*. This really proves nothing at all, for, as Mr. Leech tells me, he made no special notes on the larvæ, and did not take a description of them, so that out of the great quantity he had nothing is more probable than that the five were overlooked, especially as then he was not particularly interested in the species. The much more probable solution of the fact of the two species being found together, in both the Madeiras and Canaries, is (as Mr. Leech has suggested) that *callirhoë* is the indigenous species, and that *atalanta* has been recently introduced. This solution is also strengthened by the fact that the latter is a very much scarcer species, whilst the former is abundant in both groups of islands.

Dr. Christ, in a paper on the "Insects of Teneriffe" (Mitth. d. Schweizer Ent. Soc., vol. 6, p. 340), says that *callirhoë* holds the same relation to *atalanta* that *cheiranthi* does to *brassicæ*. This, certainly, is not the case in Madeira, if it is in Teneriffe, for both the former species are found flying together in Madeira, whereas only *Wollastoni* (the Madeiran form of *brassicæ*) is found there, for, out of all the specimens of this insect before me, there is certainly not one true *brassicæ*. Evidently, therefore, the two cases are not analogous in this instance.

Vanessa cardui, L.

Similar to the ordinary type, but perhaps somewhat paler; common, as usual.

Argynnis lathonia, L.

Abundant, and of the usual form.

Satyrus semele v. *maderensis*. (Pl. XII., figs. 2, 2 *a*).

The form of this species is, I consider, quite sufficiently modified to warrant a varietal name. It is so very uniform in coloration and so much darker than the usual type, and is so thoroughly constant, that Mr. Wollaston himself considered it to be "a fixed geographical modification" ('Variation of Species,' p. 34).

The whole of the upper surface is uniform dark brown (darker than any *semele* I have ever seen), and without the dusky transverse band near the margin of the fore wings, though very occasionally there is the slightest trace just visible. The two black spots near the hind margin of the primaries are present as usual, and are sometimes pupilled with white. In the secondaries there is generally a trace of the transverse band, and near the anal angle there is a black spot encircled with tawny and pupilled with white. On the under surface there is no difference in the pattern of markings, but the marbling of the hind wings is darker and richer in colour, and the whitish band is broader and whiter, whilst the brown posterior margin of the fore wings is broader and darker, extending between the spots.

In the ♀ the colour is likewise darker, the pupilled spots are present as usual in the primaries, but the tawny encircling of the apical spot is smaller and duller, being reduced to a short dash on each side, whilst the surrounding tawny patch of the lower spot is quite dusky, and decidedly smaller than in the ordinary form. The secondaries are also rather darker and duller, the tawny band, being replaced by the whitish band of the under side, showing through; the ocellated spot near the anal angle is present as usual. The under side is darker in every particular, and the dark posterior margin is much broader, and extends as a patch between the two black spots.

I have been unable to trace any record of this insect from the Canaries or other Atlantic islands.

Pararge xiphia, F.

Mrs. Wollaston says this is one of the commonest species in Madeira at intermediate elevations, and wasted examples may be found throughout the winter,

especially in the district above Funchal, called "the Mount." It was described by Fabricius in 1775 from Madeiran specimens.

Xiphia is now so well known that it is quite unnecessary to redescribe it. There is no doubt in my own mind that it should retain its specific rank, but the present seems to be a good opportunity of settling the position of var. *xiphioides*, which insect is certainly a form of *ægeria*, and not of *xiphia*.

The whole of the markings of *ægeria* are carefully reproduced in var. *xiphioides*, the difference being that the Canary form is much darker and richer in colours in all respects, and that the spots are somewhat reduced in size. If in our own common form of *ægeria* (*ægerides* of Staudinger's Catalogue) the olivaceous brown was replaced by a deep rich umber and the pale spots altered to a pale sienna, we should have var. *xiphioides* exactly, only perhaps a trifle smaller than the average size of the Canary insect. The same remarks apply to the under side, the only difference being great intensification and richness in colour.

Between the Madeiran *xiphia* and these two insects there appear to me to be constant differences. The two spots in the median portion of the wing are quite wanting in the former; the whole of the posterior margin is entirely dark, there being no pale border or pale spot therein; and the streak or short dash on the secondaries within the ocellated row is much increased in size, often extending three-quarters across the wing. Furthermore, the ♂ is adorned with a patch of long downy scales in the primaries, extending all over the discal cell, smoothed down from the costal towards the inner margin, and terminating in a blackish line just below the said cell. The under side is rather variable as to the hind wings, the general hue being much richer, with an absence of markings (a sort of obsoletion) and uniformity of colour; this, however, is sometimes varied by great contrast, from rich red-brown to grey and white, this being caused by the great intensification of the hue of the usual pattern. Added to this, the Madeiran species is uniformly much larger than either *ægeria* or var. *xiphioides;* the smallest *xiphia* is decidedly larger than the largest var. *xiphioides* I have ever seen, whilst the latter is larger than the common European species. In

xiphia, again, the ground colour is darker and richer than in either of the other insects, and the spots are more reduced even than in the Canary form, and are also often much obscured.

Out of thirty-five *xiphia* before me, the average size is ♂ 49, ♀ 58 mm. The largest ♂ is 50 mm., whilst my two largest ♀ measure 64 mm., and the smallest ♂ is 47 mm. bare, but this is evidently an abnormally small specimen; whereas the largest ♀ var. *xiphioides* is 45 mm., *i. e.*, two millemetres smaller than the unusually small Madeira ♂.

Acherontia atropos, L.

Differs in no respect from the usual type.

Sphinx convolvuli, L.

Common in Madeira, but does not differ at all from either my British or European specimens. There are none of Dr. Christ's variety *batatæ* among those before me.

Deilephila titymali, B.?

One specimen; too worn to identify with certainty.

Deilephila lathyrus?

Two specimens, which are very much nearer this Indian species than any other. They certainly are not *titymali*, whose wings are a different shape; and being so very close indeed to *lathyrus*, I deem it wiser to place them under this insect.

Deilephila livornica, Esp.

Similar to the usual type.

Macroglossa stellatarum, L.

Common. Similar to the European insect, but perhaps a little darker in colouring.

Deiopeia pulchella, L.

The only specimen taken has the fore wings very much less spotted than usual.

Bryophila maderensis, n. sp.

Primaries uniformly dark grey. The dark central area is enclosed on the basal side by a pale grey wavy, almost perpendicular, stripe, and on the posterior side by a very frequently and sharply toothed black line, edged on the outer margin with whitish, which line recedes well back between the median and submedian veins, but advances again from the latter to the inner margin; this line is occasionally somewhat indistinct, so as to almost make the whole of the hind three-fourths of the wing look uniform dark grey. The reniform stigma is more distinct than usual, being defined by a fine black margin immediately above it. The costa has two whitish spots; the extreme posterior margin is rather paler than the central area, with a somewhat roughly spotted appearance. The fringes are grey, with the usual dark dividing line strongly scalloped. Secondaries uniform dark brownish grey; fringes paler grey, with a dark dividing line. Thorax and abdomen same hue as the primaries and secondaries, respectively. Al. ex., 28—29 mm.

This species does not come very near any European species, but approaches closest to *algæ*, but may be at once separated from it by the absence of any green tinge, by its uniform dark grey hue, and by the dark central area being bordered on its basal margin by a whitish grey band, and by the serrated line on its posterior margin. Not uncommon in Madeira.

Agrotis (*Tryphæna*) *pronuba*, L.

Abundant in Madeira, and variable as usual.

Agrotis saucia, Hb.

Abundant, and similar to British examples in all respects.

Agrotis segetum, Schiff.

Fairly common around Funchal, and variable as usual.

Mamestra (*Hecatera*) *maderæ*, n. sp. (Pl. XII., fig. 3).

Primaries rather dark ash-grey; orbicular and reniform stigma very distinct, and encircled with a black line. Of the toothed transverse lines, the first, by the base, is pale, edged on each side

with black, extending from the costa to the lower median vein; the second, before the orbicular stigma, likewise paler grey, and margined on each side with a black line, extends all across the wing; the third is a single fine black line all across the wing, and cutting the base of the reniform stigma; the fourth curved and very frequently toothed line, is just beyond that stigma, and is edged posteriorly with pale grey; the subterminal line is paler and edged interiorly with dark grey, and is somewhat interrupted. The ground colour is paler grey from the fourth line to the hind margin, which margin is darkly dotted. Beneath the orbicular stigma is an oval pale spot, encircled finely with black. The costa has a pale spot over the reniform stigma. Secondaries pale grey, with a broad dark posterior border edged anteriorly by a light hue, which is again margined by a dusky line. Fringes of primaries grey, the outer half is tessellated with white. Fringes of secondaries grey, with paler extremities. Head and thorax pale grey; abdomen somewhat darker. Al. ex., 34 mm.

One specimen only in the National Collection.

This insect is nearest *Hillii* (Grote), but can be recognised by its uniformly much darker colour, and it has no pale blotch on the inner margin at the anal angle.

It is readily distinguishable from *serena* by its much more uniform and dark colour, and by the absence of any pale patch by the basal and posterior part of the wings.

Epunda albostigmata, n. sp.

Primaries brownish grey, with a short black dash from the base; between the base and the discal cell the central area is decidedly darker than the rest of the wing; the orbicular stigma is white and *v*-shaped; the reniform stigma is grey, broadly encircled with white; on the costa, between this and the apex, are three small whitish dots, a submarginal row of pale grey spots extends from the apex to the inner angle. The scalloped hind margin is faintly edged with black. Fringes pale yellowish, with a dark margin. Secondaries grey, dusted with brownish, and having a line of darker shading beyond the centre, with the blackish central spot of the under side showing through. Fringes as in primaries. Antennæ pectinated. Al. ex., 46 mm.

I have but one specimen of this insect, labelled "San. Antonio de Serra," which is about 2000 feet. It is nearest *E. mamestrina*, Butl., but differs in that the

general hue is browner, whilst the orbicular stigma is white; moreover the dark central area is more restricted and defined, being roughly triangular in shape. The secondaries are also browner, and have a dark transverse line beyond the centre; whilst the antennæ are pectinated like *Grotei*, and not pubescent like *mamestrina*. Its correct position will be between these two species.

Hadena atlanticum, n. sp.

Primaries reddish brown, with a short distinct basal black dash forked from its centre, just beyond which is a small indistinct dusky patch on the inner margin; orbicular stigma encircled by a fine black line; reniform darker than the ground colour on its inner margin, then somewhat paler, the posterior margin being edged with whitish; between these two stigmas the ground colour deepens in its tone. The blackish and sharply dentated line, just beyond the reniform stigma, has scarcely a trace of the lighter edging so often seen in *adusta*. The reddish yellow subterminal line is very much interrupted, and almost resolves itself into a row of buff spots, and it lacks the preceding row of dark spots usual in the aforesaid species; the posterior margin is finely scalloped with blackish. Fringes paler than ground colour, with a dark dividing line. Secondaries brown, darker around the posterior margin. Antennæ pectinated in both sexes. Al. ex., ♂ 43, ♀ 45 mm.

From *adusta* (its near ally) it can be separated by its more uniform and altogether redder appearance, by its uniform brown hind wings, and by its pectinated antennæ.

I have a ♂ and ♀, bearing the labels in Mr. Wollaston's writing, "The Mount" and "San. Antonio de Serra," respectively, both of which are stations of about 2000 feet, or somewhat more.

Eriopus Latreillei, Dup.

Of this insect I have seven specimens, all of which agree *inter se*, and they are a beautiful form of the ordinary type. Instead of being of the usual colour, they are all suffused with a very pretty rosy tinge, more especially over the hinder half of the wing; the markings are also of a deeper and richer colour, the two thus combining to make a very pretty insect out of a rather dull one. The rosy tinge also extends to over the hairy tufts of the fore legs, over the outer portion of the under

surface of the hind wings, and to a less extent over the under surface of the primaries.

Prodenia littoralis.

Common, but similar to the usual form.

Phlogophora periculosa and var. *brunnea.*

This very variable North American insect is not uncommon, and varies in like manner to the American specimens; there are two of the dark variety *brunnea.*

Phlogophora Wollastoni, n. sp.

Primaries brownish pink, with the posterior margin darkly and broadly edged, the apical half of which is dusted with fine lustrous greyish scales, as also is the costa from the upper part of the discal cell. The orbicular and reniform stigma are of the same somewhat greyish colour; in the middle of the posterior half of the latter is an ochreous patch; from the lower edge of this stigma, and, as it were, continuing the oblique posterior margin thereof, is a broadish stripe of dark reddish grey extending to the inner margin; beyond this are three indistinct spotted fine lines of greyish shading, the first of which is only visible for its lower half, the second extends obliquely from near the apex to the inner margin; these are followed by a paler stripe of the ground colour, which has a double border of reddish brown and pale ochreous, which ochreous line touches the lustrous grey marginal edge. About midway between the base and the orbicular stigma is a grey transverse line extending from the costa to the inner margin. Fringes brownish pink, with a pale edging, and scalloped as usual, but not hollowed out internally by the anal angle. Secondaries pinkish grey, with a narrow greyish margin, followed by a broad band of paler pinkish to near the centre, from whence the colour becomes greyer to the inner margin. The upper margin is pale ochreous for its first two-thirds, beyond which it assumes a pinkish hue. Thorax and abdomen as primaries and secondaries respectively. Antennæ slightly pubescent.

This very pretty insect approaches nearest to *periculosa*, but can be at once separated by its very uniform pinkish hue, and by the entire absence of any darker central area.

Only one fine specimen was taken at S. Antonio de Serra, which measures nearly 50 mm.

Nyssocnemis dubiosa, n. sp.

Primaries umber-brown, with the central area enclosed by the inner line and elbowed line of a deeper velvety brown. The orbicular and reniform stigmas of the usual *Phlogophora* shape, the former being of the same hue as the ground colour, as also the latter, but this is in another specimen of a pale ochreous; the half line at the base of the wings is fairly distinct, and so is the subterminal line, which is sharply dentate. Costa with three small pale ochreous dots between the reniform stigma and the apex. Fringes same hue as primaries, with a darker central shading. Secondaries brownish grey, somewhat paler towards the base, with paler fringes, which are scalloped, as is also the posterior margin. Thorax and abdomen as fore and hind wings respectively. Antennæ pectinated. Alar expanse, 39 to 41 mm.

I have been a little doubtful where to place this species. The genus *Nyssocnemis* has the antennæ almost ciliate, but in *dubiosa* they are merely pectinate; in every other feature, however, it is so close an ally to *obesa*, that I think there is no doubt that it should be placed in the same genus with that insect, from which it may be recognised by the antennæ, as just mentioned, and by its rather smaller size. In my insect the orbicular stigma is very distinct, but very indistinct in *obesa;* the secondaries are also darker and more uniform than in that species, which has them of a pale yellowish grey hue, with a broad dark posterior margin.

Nonagria sacchari, Woll. (Pl. XII., fig. 4).

"Alis anticis lutareis, puncto nigro plicæ ante medium, altero disci in medio, serie curvata punctorum nigrorum pone medium, linea transversa nigra fere ad marginem postremum; alis posticis albidis immaculatis. Exp. alar. 17½ lin."*

Primaries uniform brownish grey, with a small black dot before the centre just beneath the discal cell, and generally another indistinct one about the centre, which, however, is not quite constant; between this and the posterior is a curved row of small black dots, and close to the hind margin, but not absolutely on its edge, is a line of black composed of small dots. Fringes pale brownish grey. Secondaries whitish, tinged with grey. ♂ antennæ

* 'Annals & Mag. of Nat. History' (1858), 3rd Series, vol. i., pp. 117, 118.

slightly pectinate, ♀ pubescent. Thorax and abdomen same as primaries. Alar. ex. about 37 mm. ♂, 42 ♀.

In the same paper from which this is transcribed, Mr. Wollaston writes :—"Inhabits Madeira proper, and has probably been imported into the island, being extremely destructive to sugar-canes. The caterpillar, which may be taken during the summer months, lives in the interior of the stem, where it does incalculable damage to the cane, more or less spoiling the entire crop. I am indebted for an excellent specimen of the imago to C. Bewicke, Esq., who reared several of them in Funchal during the autumn of 1855, and who communicated to me some interesting observations concerning the habits of the insect. It appears totally distinct from the *Diatræa sacchari* of the Rev. Lansdown Guilding (Trans. of the Soc. of Arts, vol. xlvi., p. 148, A.D. 1828); as also from the *Proceras sacchariphagus*, Bojer (described in the 'Report of the Committee on the Caneborer,' and published at the Mauritius), which belongs to an altogether different family, the *Pyralidæ;* as well as from the *Noctua sacchari* of the 'Papillons de Surinam' (pp. 135, 136, pl. 64, A.D. 1848)."

Leucania extranea, Gn.

Abundant; most of the specimens are labelled San. Antonio de Serra, which shows that it is common at an elevation of at least 2000 ft.

Caradrina quadripunctata, Fab. (*cubicularis*).

Two specimens, one of which is labelled Funchal.

Caradrina exigua, Hb.

One fine specimen in the National Collection, taken by Mr. Wollaston.

? *Calymnia ferruginea*, Walker.

This species was described by Walker under the genus *Hydrelia* from a single insect, with the label, "This species has been taken by W. D. Crotch, Esq., in Teneriffe." I have before me seven specimens from Madeira, which show that it cannot belong to that genus. It appears to me to be nearer *Cosmia*, and, after care-

fully comparing its characteristics, I have come to the conclusion that its best resting place will be in Hübner's genus *Calymnia*, in which I therefore place it with a (?).

Cucullia chamomillæ, Schiff.

One specimen, which does not differ from our own specimens.

Plusia aurifera, Hb.

Fairly common.

Plusia chalcitis, Esp.

Common at low and intermediate elevations.

Plusia gamma, L.

This ubiquitous insect is not uncommon, and presents no points of difference from the ordinary type.

Plusia circumflexa, L.

Very common; two of the specimens are labelled by Mr. Wollaston "Funchal," but it is improbable that it is confined only to this low elevation. Some of the series are very richly and beautifully coloured.

Heliothis peltiger, Schiff.

One specimen in the National Collection from Mr. Wollaston.

Heliothis armiger, H.-S.

Three specimens without a precise locality.

Acontia lucida, Hufn.

Two specimens, rather darker than usual, from Madeira and Porto Santo.

Thalpochares ostrina, Hb., and var. *æstivalis*, Gn.

The two specimens of the former are richly coloured; the second generation presents no difference whatever from Algerian specimens.

Spintherops dilucida, Hb.

There is one specimen of this insect in the National Collection, taken by Mr. Wollaston, which is very much paler than any of my specimens from the South of France.

Hypæna lividalis, Hb.

There is one specimen of this insect which does not differ from the ordinary type.

Hypæna obsitalis, Hb.

Very common, and, as usual, very variable, many of the specimens being almost black.

Hypenodes costæstrigalis, Steph.

Not uncommon, and somewhat darker than the ordinary form, one specimen being very dark indeed.

Nemoria nubigena, Woll. (*Hemithea nubigena*, Woll.).

"Alis viridibus, striga posteriore alba communi subindistincta ornatis, costa alarum anteriorum albido-ochracea. Exp. alar. 9 lin." *

The ground colour of both primaries and secondaries is emerald-green; the posterior stripe extends all through both wings, and is white. In some specimens this stripe is fairly broad, but it varies considerably, and in other examples simply consists of an indistinct row of dots. The costa in fresh specimens is pinkish, but becomes ochreous by wear and exposure. The fringes are white, tipped (in a freshly-emerged insect) with pinkish. Abdomen and thorax green. Antennæ ochreous, ciliate in ♂, simple in ♀. Exp. alar. 19 to 22 mm.

In the same work that I have already quoted from, and on the same page, Mr. Wollaston says :—"Inhabits Madeira proper, occurring among the heath-woods of the loftiest elevations. Whilst encamped on the extreme summit of the Pico Ruivo (upwards of 6000 ft. above the sea), early in August, 1850, it flew into my tent in great abundance, attracted by the light of the candle, after sunset."

* 'Annals & Mag. of Nat. History' (1858), 3rd Series, vol. i., p. 118.

Acidalia maderæ, n. sp.

Both primaries and secondaries are of the same hue, and have the same markings carried through them. The colour is ochreous grey, without any markings before the dark central spot; behind this is a fairly distinct but ill-defined darkish broad transverse stripe, beyond which is an oblique wavy greyish line; midway between this and the posterior margin is the broader subterminal greyish line. The margin itself is very finely and darkly edged, and is very slightly scalloped. Fringes same hue as wings. Antennæ slightly pubescent. Exp. alar. 23 mm.

I have two females from Madeira proper.

Acidalia dimidiata, Hufn. (*scutulata*, W. V.).

Common and very variable. I have but one specimen of the type we usually find in England; there are, however, several somewhat similar in general tone, but they have a very broad blackish band all across the centre of the primaries, and extending in like manner through the secondaries. Another very prevalent (in fact, the commonest) form is much darker than usual, and also larger, and of the ordinary pattern, with the addition of an indistinct band across the central area.

Acidalia atlantica, Stainton, (non *atlantica*, Walker).

"Walker's name *atlantica* must now sink as a synonym of *A. separata*, Walk. Mr. Warren, who has recently gone through the *Geometræ* in the National Collection, considers *Acidalia separata*, Walker, and *atlantica*, Walker, both from St. Helena, in the Wollaston cabinet, to be one and the same species, in which opinion I have not any doubt that he is correct, for it would be impossible to separate some of the specimens, and the main markings are all identical. Walker's name *atlantica*, therefore, sinks as a synonym of *separata*, whilst Stainton's name for the Madeira species remains good."

This species was described by Mr. Stainton in the Ann. & Mag. Nat. Hist., 3rd series, vol. iii. (1859), p. 210, where he says:—"Allied to *Acidalia virgularia*, but paler and neater; the three lines parallel, and distinctly angulated towards the costa; the discoidal spot

placed on the central line, and the hind margin of the hind wings more dentated, the hind tibiæ of the male are incrassated, with no spurs, and the tarsi almost obsolete; the hind tibiæ of the female have one pair of spurs. Inhabits Deserta Grande." I have a few specimens from Madeira, evidently referable to this insect; they are, however, in addition to the distinctions drawn by Mr. Stainton, certainly smaller than *virgularia*.

Acidalia unostrigata, n. sp.

Primaries and secondaries uniform pale ochreous, with the usual dark central spot, behind which, but adjoining, is a broad dark grey transverse band extending from the costa to the inner margin, and continued all through the secondaries, but on the other side of the central spot, *i. e.*, between it and the base. There are no other markings at all, except the least trace of a row of very minute dark spots between this and the posterior margin of the primaries. At the extremities of each of the nervules the hind margin is finely and darkly dotted. Fringes rather paler than fore wings. Exp. alar. 22 mm.

One specimen from Madeira appears to be nearest the black-banded form of *dimidiata*, but it can be at once distinguished by the uniform ochreous colour, with no other markings save the dark band. The wings are likewise of a different shape, being narrower and less ample, whilst the costa and hind margin is straighter, thus making the apex sharper.

Acidalia zargi, n. sp.

Primaries pale ochreous, the basal area, extending half-way to the central spot, being of a rather pale chocolate colour; the posterior margin is very broadly bordered with the same chocolate hue, in the centre of which is a waved ochreous interrupted line. The space between these two areas is ochreous, dusted more or less all over, but especially in the centre (where it almost forms a transverse stripe), with fine pinkish rusty scales. The secondaries are likewise pale ochreous, finely dusted with the same coloured scales, which are somewhat condensed around the central spot so as to form a trace of a transverse stripe; otherwise there is no marking until the posterior margin, which is like the fore wings, but rather paler, *viz.*, pale chocolate, with a distinct wavy ochreous submarginal line, preceded, however, by another indistinct ochreous

line just within the chocolate border. Fringes paler chocolate. Exp. alar. 27 mm.

This is a very pretty insect indeed, and it is to be regretted that but one ♀ was taken in Madeira. It is like no European *Acidalia* known to me.

Acidalia Wollastoni, n. sp.

All the wings are uniform dull magenta, slightly deeper in hue by the posterior margin, with a very small central white spot in each. Between this spot and the base there is a faint trace of a jagged transverse buff-coloured line, which line on the secondaries extends from the discal cell to the inner margin. The pinkish ochre subterminal line is very distinct in both the wings, extending to its fullest limit in each. Fringes magenta, with pinkish ochre extremities. Thorax and abdomen as primaries. Exp. alar. 26 mm.

Of this beautiful *Acidalia* there is but one specimen from Madeira.

Acidalia irrorata, n. sp.

Primaries and secondaries pale ochreous grey, finely and plentifully sprinkled all over with minute dull reddish irrorations. There is scarcely a trace of the first line; the grey spots are fairly distinct, as is also the ill-defined central grey transverse band. The scalloped grey subterminal line is also fairly distinct. All the markings of the primaries apply in like manner to the secondaries. The posterior margin is darkly bordered. Fringes ochreous. Antennæ ♂ pectinate. Exp. alar. 26 mm.

One ♂ from Madeira.

Zonosoma (*Ephyra*) *pupillaria*, Hb.

I have several of this species, all of which differ from the ordinary type, and are a very pretty form. Both wings are of a pale buff, slightly freckled more or less all over with pink. The central spots white, encircled with pink. The subterminal line is represented by a curved row of pinkish dots. In the ♀ the colour is similar to the ♂, but both the first and subterminal lines are represented by a curved row of dark grey spots finely encircled with pinkish, and the central band is dark grey, indistinctly edged with a few pinkish scales.

Zonosoma (*Ephyra*) *maderensis*, n. sp. (Pl. XII., fig. 5, banded form).

Primaries ochre-colour, finely and densely irrorated with rough pinkish scales, more especially by the posterior margin. The central waved band just beyond the spot is of a greyish hue. The subterminal line is distinct and of paler ochre; posterior margin finely and darkly dotted. Central spot whitish, encircled with reddish brown. The secondaries are likewise ochreous, with all the pattern of the primaries repeated, but the subterminal line is broader than therein. Thorax and abdomen same hue as wings. Antennæ ♂ ciliate, ♀ simple. The ♀ is similar to the ♂. Exp. alar. 26 mm.

This is evidently a common species in Madeira, and, like many others found in the island, it varies considerably. I have specimens almost unicolorous, with scarcely a trace of any markings except the central spot, whilst there are others which are very broadly and darkly banded; one of the handsomest of these will be found figured. Again, I have one or two almost unicolorous fawn-colour, with a single dark grey waved central stripe just beyond the central spot. Mr. Wollaston says of the larva:—"A small green caterpillar with brightly variegated patches on either side. Chrysalis bright pale green, fixed by the tail and slung up horizontally with a single thread. Feeds on Hudson's oak."

Hemerophila maderæ, n. sp. (Pl. XII., fig. 6).

The primaries and secondaries vary from dull umber-brown to a reddish umber. The first and second oblique somewhat parallel lines are dark brown, both arising from the inner margin, the former near the base, and extending indistinctly half across the cell, the latter starting beyond the centre, and extending almost up to the apex. At the tip of the discal cell is a smallish dark spot. The whole of the wing is scaled with darker brown irrorations. The pattern of the secondaries is similar to the primaries, but minus the first line; the ground colour is at times slightly paler, and is thickly covered with dark brown scales taking the shape of short dashes. Thorax, abdomen, and fringes as wings. Antennæ plumose. Exp. alar. 43 to 44 mm.

The ♀ is very pale ochreous grey, with the first and second line as in the ♂, but blackish; the central spot is larger. There is also a blackish shading at the tip of the second line just below the apex of wing, which follows for a short distance the course of the aforementioned black line. Secondaries slightly deeper in hue than

primaries, with the second line blackish and rather broad, and with a slight dark dusting between it and the margin; the first line is likewise distinct and black, whilst the base of the thorax is also black; so that, when the wings are expanded, the first line assumes the form of the crescent. The dark scales on the secondaries are much fewer than in the ♂, and are dark greyish. Antennæ slightly pubescent. Exp. alar. 37 to 40 mm.

There is one very fine variety of this insect in which the whole of the space from the first to considerably beyond the second line, and extending right up to the margin below the apex, is of a very dark and rich umber-brown; and in the secondaries this colour extends from the base of the wings to near the posterior margin, whilst the ground colour is of a more yellowish tint than usual. This insect does not appear to be very near any other species of the genus, but the very different and pale ♀ will serve to distinguish it from its allies.

The figure of this fine insect is rather more highly coloured than my specimens, or than those in the National Collection, but this may arise through them being somewhat faded.

Boarmia Wollastoni, n. sp. (Pl. XII., fig. 7).

Primaries rather dark brownish grey; the first transverse line blackish, closely followed by a second, both being waved and toothed; at the end of the discal cell is a reniform-shaped patch of raised paler scales, edged with black, from whence to the inner margin runs a black line, bluntly toothed near the centre; beyond this is a very frequently and sharply serrated curved transverse black line, followed in its upper third by a row of dark dentations; beyond this is an indistinct waved stripe of paler ground colour, succeeded by an indistinct interrupted scalloped line of whitish, from which to the margin the ground colour is darker. The extreme posterior margin is finely edged with black. The basal and central areas, and also the margins of the transverse lines, are sparingly scattered over with ochreous scales, which are likewise present over the pale stripe beyond the serrated line, though in a less degree. Fringes grey, intersected with darker grey. Secondaries greyish brown, darker on the outer margin, with an indistinct pale scalloped submarginal line, and a darker line beyond the centre. Fringes greyish brown. Exp. alar. 38 to 40 mm.

The ♀ is very pale whitish grey, with all the marks repeated as in the ♂, but in a darker shade of grey. The space between the

two central toothed lines is dark grey for its lower half. Posterior margin darkly dotted. Fringes whitish, with grey extremities and intersections. Hind wings pale grey, marked as in ♂. Exp. alar. about 46 mm.

Var. *obscura*.

Basal area almost black; between the outer basal and the inner central line is a broad band of greyish, over which a few dark scales are scattered; beyond this the whole of the wing is sooty black, with a small apical grey patch, and the pale scalloped interrupted line fairly marked. Secondaries as in *Wollastoni*. Exp. alar. 40 mm.

The ♀ of this variety copies its ♂ precisely, but the colour, instead of being sooty black, is dark dirty grey. Exp. alar. 43 to 44 mm.

This appears to be a constant form, being not improbably the second brood, and as such seems worthy of a varietal name.

Mr. Wollaston describes the larva thus:—"Caterpillar of a pale dirty yellowish buff, with a paler line down the middle of the back, and very obsoletely freckled (or rather pencilled) all over with indistinctly traceable scroll-like markings. The legs and prolegs and the sutures of the segments have a faint rosy tinge. Feeds on common broom."

Common at St. Antonio de Serra. This species is extremely variable, some being of a palish uniform grey, others almost all black; and, though there are not in the series before me (38) connecting-links between them, I entertain no doubt but that in a really large series every transitional form could be traced.

Eubolia rupicola, Woll. (Pl. XII., fig. 8).

"Alis anticis fuscis, saturatiore lineatis, striga anteriore parum angulata, striga posteriore (extus dentem emittente et albido-marginata), punctis dilutis, maculisque duabus marginem posticum versus nigro fuscis ornatis. Exp. alar. 16 lin."*

Primaries umber-brown; basal line darker, palely edged posteriorly, with a very broad dark brown central space (in which are several dark serrated lines), angulated exteriorly and margined with whitish; in the middle of this space is a paler fascia, with a

* 'Annals & Mag. of Nat. History' (1858), 3rd Series, vol. i., p. 118.

dark spot in the upper part thereof. Between the basal line and the dark central shade is another dark indistinct line. The submarginal waved line is dark brown, and usually composed of small scallops; between this and the posterior margin there is generally a small dark clouding in the upper part of the wing. Fringes brown. Secondaries paler brown, covered with most indistinct wavy transverse lines, which are occasionally quite obsolete. Antennæ ♂ ciliate, ♀ pubescent. Exp. alar. 34 to 36 mm.

Like several other Madeiran insects, it varies a good deal, the extreme in the one direction being very dark, with the central shade almost black, whilst in the contrary direction the colour is paler than in the type, and the central part of dark space becomes nearly quite white. Another form has the central space broadly edged with white posteriorly, whilst yet another is almost uniform umber-brown, with nearly all the pattern obliterated. This is evidently one of the commonest insects in the island.

Mr. Wollaston, in the paper already referred to, says: —"Inhabits Madeira proper, abounding at intermediate elevations throughout the sylvan districts, and secreting itself generally beneath the overhanging projections of the rocks, which it more or less resembles in colour."

Sterrha sacraria, L.

The one specimen taken near Funchal has the pink band very broad, the costa near the base is margined with pink, and there are a few pinkish scales in the median portion of the wing; they are not, however, by any means sufficient to call it v. *sanguinaria*.

Coremia centro-strigaria, Woll. (Genus *Cidaria* of Staudinger's Catalogue). (Pl. XII., fig. 9).

"Alis anticis griseo-ochreis, basi ac area centrali rufescentibus, hæc fasciam nigram extus prope costam acute angulatam includens. Exp. alar. 12 lin."*

Primaries greyish ochre, with the basal and broad central areas reddish, in the latter of which is a broadish transverse fascia of a dark bluish grey colour, in the upper part whereof is the black central spot; both these areas have several transverse darker wavy lines, and the latter is edged on the outside with whitish, beyond

* 'Annals & Mag. of Nat. History' (1858), 3rd Series, vol. i., p. 119.

which is the subterminal scalloped line, followed by a darker clouding of pale reddish up to the hind margin, in which (clouding) is another short pale scalloped line. The same markings are carried through the secondaries with the dark central fascia, and the substitution of darker greyish for the reddish hue. ♂ 22, ♀ 24 mm.

Mr. Wollaston says:—"Inhabits Madeira proper, and is allied to the *C. ligustraria* and *ferrugaria* of more northern latitudes."

Cidaria fluviata.

A common species at low and intermediate elevations, but offering nothing noteworthy, being quite similar to those found in our own island.

Gymnoscelis insulariata, Stainton. (Genus *Eupithecia*, Stgr.).

Mr. Stainton says of this species (Ann. & Mag. Nat. Hist., ser. 3, vol. iii., p. 209):—"Allied to *Eupithecia pumilata*, but central portion of the wing darker, the second paler fascia more angulated and indented, and especially distinguished by the reddish fascia on the posterior wings and the reddish spots on the abdomen. Inhabits Madeira proper, Porto Santo, Dezerta Grande, &c."

I have before me upwards of thirty of this insect, and find these differences somewhat variable; it is evidently common at low and intermediate elevations, and seems so close an ally of *pumilata* that I think it is most probably the Madeiran form of that species.

Gymnoscelis bicoloria, n. sp.

Primaries silver-grey, with the dark grey basal area confined by a darker curved line; beyond the centre there is another dark transverse curved line, behind which the whole of the wing is closely dusted with blackish scales, which extend over the said line for its lower portion, and more than half across the inner margin of the wing. There is the least trace of a pale subterminal line close by the posterior margin. Fringes dark grey. Secondaries likewise grey, with the posterior margin darkly dusted, in which dusting there is an interrupted pale line. Fringes grey. Exp. alar. 16 mm.

Of this well-marked species I have but one specimen, which was taken high up about the fir-tree limit.

It may be worthy of remark that of the *Eupithecicæ* at present known from these islands, both of the species belong to the subgenus *Gymnoscelis*.

This completes my list of Macro-Lepidoptera (the *Tineinæ*, &c., being as yet unnamed, will, I hope, be catalogued in a later paper). There does not appear to be anything to call for special remark beyond what has already been done; there is, however, one point that has struck me in looking over the collection. Besides the tendency to great variation there is also a decided tendency to assume a pink or reddish hue. In the South and West African fauna I am informed that this tone of colour is also prevalent, in which case it is interesting to note that in these Atlantic islands we find the meeting-place, if I may so call it, of the Palæarctic, Ethiopian, and Nearctic insect fauna; of course, the great majority of insects belong to the former, to which region they (the islands) undoubtedly belong, but the others are also represented by a similarity in colour, or by the Lepidoptera themselves.

Explanation of Plate XII.

Fig. 1. *Rhodocera cleopatra*, v. *maderensis*, Feld.
1*a*. ,, ,, ,, under surface.
2. *Satyrus semele*, v. *maderensis*, Baker.
2*a*. ,, ,, under surface.
3. *Hecatera maderæ*, Baker.
4. *Nonagria sacchari*, Woll.
5. *Zonosoma maderensis*, Baker (banded form).
6. *Hemerophila maderæ*, Baker.
7. *Boarmia Wollastoni*, Baker (typical ♀).
8. *Eubolia rupicola*, Woll.
9. *Coremia centro-strigaria*, Woll.

IX. *Additions to the Carabideous fauna of Mexico, with remarks on some of the species previously recorded.*

By Henry Walter Bates, F.R.S., F.L.S., &c.

[Read February 4th, 1891.]

Plates XIII. & XIV.

The present paper is in continuation of that read last year to the Society on the subject of the *Cicindelidæ* of Mexico, and has the object of making known the additions to the *Carabidæ* of the Mexican fauna that have been received by Messrs. Godman and Salvin, or have otherwise come to our knowledge, since the publication of vol. i., part 1, of the 'Biologia Centrali-Americana,' in 1884. In that work the number of species of *Carabidæ* recorded from Mexico was 650. The additions in the following pages bring the total up to 744, there being 93 species, of which 70 are described as new, and 23 new to Mexico, but previously described chiefly from North America. Seven previously known genera, *Micrixys*, *Dercylus*, *Pangus*, *Cratacanthus*, *Agonoderus*, *Pristodactyla*, and *Pogonus*, and one new genus, *Xenodromius*, are added to the Mexican list. Some notes are added in elucidation of certain species included in the original work in the 'Biologia,' rendered necessary by the results of the examination of much ampler material than was formerly available. Precise localities are now known for several species, which previously had been recorded only as from "Mexico."

Calosoma viridisulcatum, Chaud.

Specimens of this species have been received from Herr Höge from Guadalajara.

Calosoma ampliator.

C. peregrinatori (Guér.) proxime affinis; differt corpore breviori et latiori præcipue thorace valde transverso lateribusque rotundatis nullo modo angulatis. Long. 21—27 millim.

Hab. Villa Lerdo, in Durango; Guanajuato; Jalapa; Chihuahua City; Nuevo Laredo, in Tamaulipas; Paso del Norte, in Chihuahua (*Höge*).

Distinctly shorter and broader than *C. peregrinator;* black, moderately shining, the triple row of small foveæ and the margins of the elytra, in fresh examples, metallic-green. The head is finely punctured, the forehead also coriaceous; the mandibles densely rugose and punctured; the tooth of the mentum narrower and more deflected than in *C. peregrinator* and the allied species, so that it is often invisible, without dissecting the mouth. The thorax is transverse-ovate, the sides strongly rounded, widest near the middle; the hind angles as in *C. peregrinator*, much deflected; the thickened margin much lowered and thinner at the extreme apex, which is moderately acute; the disk coriaceous or smooth, sides and base sparingly punctured. The elytra are oblong, scarcely widened behind, finely striate-punctate and triseriate-foveate. Beneath, the metathoracic episterna and sides of basal ventral segments are sparingly punctured. The legs are rather shorter and stouter than in *C. peregrinator,* and the three dilated joints of the anterior tarsi in the ♂ are short and broad, the 2nd and 3rd nearly twice as broad as long.

C. peregrinator (Guér. = *carbonatum*, Lec. sec. Horn) is found in the same localities, Chihuahua and Durango, as *C. ampliator*, but appears to be more common.

Calosoma lugubre, Leconte, Trans. Am. Phil. Soc., x., p. 400.

Hab. Nuevo Laredo, in Tamaulipas (*Höge*); Texas.

Calosoma macrum, Leconte, Trans. Am. Phil. Soc., x., p. 400.

Hab. Nuevo Laredo, in Tamaulipas (*Höge*); Texas.

This species, like the preceding, is an addition to the Mexican fauna.

Calosoma læve, Dej.

Dejean's description applies exactly to the numerous examples received from the neighbourhood of the city of

Mexico, Puebla, and other localities on the central plateau. They are of elongate-ovate form, more or less slender, with rounded thorax, having generally a narrow flattened space accompanying the thickened and, even near the hind angle, only moderately reflexed lateral margin, broadly rounded hind angles, and a vague basal fovea on each side rarely with distinct traces of punctuation. The forehead is always rather thickly punctured; the elytra very convex, the convexity beginning gradually from the base, and the posterior declivity being steep; the surface faintly striate-punctulate, rarely quite smooth. The length is 22—25 millim. The punctured forehead always distinguishes it from *C. lævigatum*, which is a smaller insect. The following seem to be nothing more than varieties:—

Var. *C. punctulicolle*.—Head punctured to the vertex; thorax broader and with distinctly wider explanated lateral margins; the basal foveæ, base, and sides punctured. Elytra faintly striate-punctate, as in the type-form, but in addition with three rows of small but inconspicuous foveoles. Long. 22—27 millim., ♂ ♀.

Hab. Santa Clara, in Chihuahua; Durango city; Monterey, in Nuevo Leon (*Höge*).

The thorax is wider and a little more quadrate in Durango examples; in the single specimen from Monterey, on the contrary, it is much narrowed behind.

Var. *C. explanaticolle*.—Head with sparser and stronger punctures; thorax behind with wider explanated margin and more broadly rounded hind angles, smooth. The rest as in the type-form. Long. 22—27 millim., ♂ ♀.

Hab. Tupataro, in Guanajuato (*Höge*).

Var. *C. microgonum*.—Precisely like the more slender examples of the type-form, with the remarkable exceptions that the hind angles of the thorax, instead of being broadly rounded, are acute, projecting a little beyond the line of the basal margin, and that the base of the thorax is also distinctly punctured.

Hab. Jalapa (*Höge*), Mexico City (*Flohr*). Three examples.

Calosoma anthracinum, Dej.

Mr. Smith captured several examples of this species at Amula, in Guerrero.

Calosoma lævigatum, Chaud.

Numerous specimens of this species have been received from Real del Monte (Pachuca), from Mr. Richardson.

Calosoma costipenne, Chaud.

Mr. Richardson captured two examples of this insect at Rio Frio.

Calososoma atrovirens, Chaud.

The precise locality of this species was unknown to the describer. Herr Höge obtained it at Tula, in Hidalgo. Only two of his examples were coloured green, with the disk of the thorax black, many others showing a green or bluish tinge only on the borders of the elytra, and on the sides of the prosternum; this is the var. *obscurum* of Gehin's Cat. des Carab. (1885), p. 65. Others from the same locality are entirely black, and are so similar to the typical form of *C. læve*, that I fail to detect any definite character by which to separate them. The only differences are the oily or silky gloss of the surface (*C. læve* being almost always polished black), and the more broadly rounded sides of the thorax preceding the hind angles; some few examples of *C. læve*, however, have precisely the same outline of thorax.

Calosoma omiltemium. (Pl. XIII., fig. 1).

C. blaptoïdi (Putz.) affinis; gracilis, niger, supra cærulescens thorace cordato, lævi postice subsinuatim angustato, angulis posticis paullo depressis acutis; elytris gracile ovatis convexis, utrinque octo-costatis, sulculis seriatim tuberculatis et foveolatis, sulcis et foveis versus apicem confusis. Long. 19—20 millim., ♂ ♀.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*).

This distinct species has the slender form and relatively small, cordate thorax, of *C. blaptoïdes*. The thorax is smooth, silky-opaque, as in that species, but the head differs in having a cluster of large punctures on each side of the forehead, and the mandibles are

smooth only on their outer side, on the inner being rather strongly striated. The thorax differs also in being less uniformly rounded, the sides behind the middle being slightly sinuated, with much more strongly elevated margins, and the hind angles more acute. The elytra are more shining, and their sculpture consists of alternate narrow ribs and wide sulci, interrupted by somewhat regular series of oblong tubercles, each tubercle separated from its successor by a unigranulate fovea; the ribs are much less sharply elevated in some examples than in others, and the sculpture becomes confused near the apex. The legs are slender; the tooth of the mentum is narrow and acute, the penultimate joint of the labial palpi is quadrisetose. The three dilated joints of the anterior tarsi in the ♂ are rather slender, the second not being much broader than long.

Calosoma diminutum. (Pl. XIII., fig. 2).

C. polito (Chaud.) similis sed multo minor et brevior, præcipue elytris breviter ovatis. Convexus, niger politus, capite thoraceque lævissimis, hoc transverso lateribus æqualiter rotundatis, disco usque prope angulos posticos convexo; elytris vix perspicue striato-punctulatis foveisque conspicuis triplice serie.

Var. Elytra distinctly punctulate-striate throughout; the triple rows of foveæ same as in the type. Long. 15—18 millim., ♂ ♀.

Hab. Salazar (*Höge*). A large series of examples, only two of which belong to the variety.

The mandibles are nearly as smooth as the head and thorax. The thorax is almost precisely as in *C. politum*, half as broad again as long, destitute of marginal groove in front, and without trace of thickening on the hind margin, the lateral border moderately thickened and reflexed, the surface smooth and without depression near the hind angles, which are broadly rounded. The elytra are strongly convex, and in nearly all the numerous examples have no conspicuous sculpture, except the three rows of foveæ, which in most specimens are strongly impressed, and one row of small intra-marginal points; but minutely punctured striæ are visible under the lens. The under side is smooth, except two or three punctures on the sides of the ventral segments. The prosternal process is broader and less narrowed behind than in

C. læve and allied species, and the femora and tibiæ are less roughened with punctures, and nearly destitute of setæ.

C. politum (Chaud.) seems to be peculiar to the neighbourhood of Toluca, where Herr Höge obtained a large number of specimens. It is very closely allied to *C. diminutum*, differing, indeed, only in its constantly more elongate form, the elytra being also longer relative to the head and thorax, and its average larger size, *viz.*, 16—21 millim.; the rows of foveæ also are seldom conspicuous.

As individuals (generally small) of *C. diminutum* occur in which the elytra are relatively more elongate than usual, the two species cannot be said to be completely segregated. But, similarly, examples occur (a few in a large series) which connect *C. politum* (Chaud.) and *C. striatulum* (Chevrolat), two species which appear so completely distinct in the majority of their individuals.

Calosoma striatulum, Chevrolat.

In describing *C. politum*, Chaudoir gives the elytral convexity as one of the characters distinguishing it from *C. striatulum*. It is true that the great majority of the examples of *C. striatulum* from Jalapa and Las Vigas have very moderately convex elytra, with the posterior slope much more gradual than in *C. politum* or *C. læve:* but examples occur in both the localities mentioned, and in both sexes, where the convexity is much greater than usual, and not inferior to that of *C. politum*. *C. striatulum* is recognisable by its narrower oblong, scarcely ovate, form, nearly as elongate as *C. striatipenne*, and by the perceptibly more quadrate thorax, besides the striated elytra; but some of the convex examples differ from the usual form also in being distinctly shorter and more ovate, and they are, in fact, exactly intermediate between *C. politum* and *C. striatulum*. As gradations occur, and the variety inhabits the same locality as the type, it is better not to give it a name, as it would be sure to be misapplied hereafter.

Calosoma morelianum.

C. diminuto quoad formam simillimum et forsan ejus varietas localis; differt tamen capite præcipue lateribus sparsim punculato

ibique leviter ruguloso; elytris apud dorsum sat grosse striato-punctatis striis nonnullis vage punctis majoribus interruptis, lateribus lævibus; foveis seriatis haud perspicuis. Long. 15—17 millim., ♂ ♀.

Hab. Huitzilac, in Morelos (*Höge*); El. Guarda, 10,000 ft. (*Flohr*).

The short ovate form and close resemblance in all essential respects would lead one to infer this to be an extreme modification of *C. diminutum*. The sculpture is intermediate between that of *C. striatipenne* and *C. cicatricòsum*, both elongate-oblong forms, and easily distinguishable.

Rare. Individuals occur, at Jalapa, intermediate in form of body between *C. morelianum* and *C. striatulum*.

Calosoma porosifrons. (Pl. XIII., fig. 3).

Sat late ovatum, valde convexum nigro-nitidum, fronte utrinque grosse punctata mandibulis thoraceque lævibus hoc valde transverso marginibus lateralibus quam in *C. polito* et affinibus multo magis explanatis, angulis posticis rotundatis et paullo productis; elytris late ovatis valde convexis sed prope suturam planatis vel depressis, margine sulcato, laterali latiori et grossius granulato-punctato; vix perspicue striato-punctulatis interdum seriato-foveatis; tibiis intermediis densius asperatim punctato-setosis; metasterni episternis ventrisque lateribus grosse punctatis. Long. 16—19 millim., ♂ ♀.

Hab. Refugio, in Durango (*Höge*). A good series of examples, all readily distinguishable from *C. politum* and *C. diminutum* by the broader intra-marginal sulcus of the thorax and depressed area near the posterior angles, independently of the strongly punctured sides, and often also the middle of the forehead. The general form of body is broader and shorter than even in *C. diminutum*.

Scaphinotus macrogonus. (Pl. XIII., fig. 5).

C. mexicano (Bates) proxime affinis; differt præcipue thoracis angulis posticis valde prolongatis, elytrisque striato-punctulatis interstitiis planissimis. Long. 17—20 millim., ♂ ♀.

Hab. Refugio, in Durango (*Höge*).

All the numerous examples of *Scaphinotus*, labelled by

Herr Höge with the above locality, are conformable to the diagnosis given above, whilst all those ticketed "Ciudad" belong to *S. mexicanus*, in which the hind angles of the thorax are only moderately produced, *i. e.*, not prolonged into a fine point, and the elytra closely and strongly punctate-striated with narrow raised interstices. The general form in *S. macrogonus* is also relatively broader, and the thorax is also a little broader and more quadrate; but *S. mexicanus* varies greatly in these respects, the thorax being sometimes strongly cordate, and more generally slightly cordate, but in some examples nearly quadrate, and the elytra more or less ovate, and often oblong or subelongate; so that reliance cannot be placed on that character. The colour in *S. macrogonus* is generally violet-black, most conspicuously so on the elytra.

Pasimachus duplicatus, Leconte, Trans. Am. Phil. Soc., x., p. 395 (1853); Bull. Buffalo Soc Nat. Sci., 1874, p. 271; *P. costifer*, id., Proc. Acad. Nat. Sci. Phil., 1854, 79.

Var. elytris lævibus.

Hab. Nuevo Laredo, in Tamaulipas (*Höge*); North America, Texas to Missouri.

The Mexican examples have no trace of the geminated rows of punctures on the elytra, which Leconte states is also the case with some of the Texan specimens, and the two lateral carinæ are well-developed, the inner one being sometimes as long as the outer.

Pasimachus ignicinctus.

P. mexicano affinis, parum convexus niger subopacus, thorace (antice excepto) et elytris anguste cupreo-aurato-marginatis; elytris basi et apud humeros latius splendide igneo-auratis, basi a humeris usque ad pedunculum parum rotundato, carinula humerali nulla, passim lævibus striis nonnullis punctulatis versus apicem vix perspicuis. Long. 28 millim.

Hab. Canelas, Sierra Madre of Durango (*Flohr in Coll. Bates*).

The thorax resembles in form that of *P. viridans* (Lec.) more than that of *P. mexicanus*, being transverse

and more narrowed near the base, but the sides behind the middle are more fully rounded, and the sinuation near the base is very short, as in *P. viridans*, but there is scarcely any trace of basal foveæ. The elytra are broader and much flatter than in either species, but are equally elongate; they are opaque, and the rows of punctures, where they are visible, are regular, not geminated; the lateral metallic margins are densely transverse-rugose. The hind tibiæ of the ♂ near the apex are pubescent.

In colours, and in the absence of elytral sculpture, this species resembles *P. aurocinctus* (Chaud.), but the elytra are very different in form, being much longer and rather less convex than *P. intermedius*, instead of shorter, more ovate and convex, as described by Chaudoir.

Pasimachus lævisulcatus.

Sat gracilis et minus convexus, toto niger nitidus, thorace fere sicut in *P. cardiodero* (Chaud.) graciliter cordato, lateribus post medium parum rotundato deinde longe sinuato angulis posticis exstantibus acutis; elytris oblongo-ovatis late striatis, striis lævibus opacis postice dilatatis, interstitiis utrinque octo interioribus minus, exterioribus magis, convexis, 2ndo, 4to, et 6to interdum paullo depressis et apice abbreviatis. Long. 21 millim.

Hab. Ciudad, in Durango (*Höge*).

Pasimachus Quirozi, Flohr, Deutsche Ent. Zeits., 1887, p. 128.

Hab. Coatepec, in Vera Cruz, alt. 3800 ft. (*Flohr in Coll. Bates*).

This species has been described since the publication of vol. i., pt. 1, of the Coleoptera in the 'Biologia Centrali-Americana.'

Pasimachus mexicanus, Gray.

Var. *cæruleus*.—A typo differt colore supra et infra saturate cæruleo marginibus subviolaceis; elytrorum carina humerali paullo longiori, sculptura nulla. Long. 28 millim.

Hab. Tula, in Hidalgo (*Flohr in Coll. Bates*). One example.

Herr Höge obtained a large series of the typical green

P. mexicanus at Tula, few only of which are black on the disk of thorax and elytra. Of the closely allied *P. viridans*, Leconte, there are two examples only in the collection, both from Ventanas, in Durango.

Pasimachus Smithi. (Pl. XIII., fig. 6).

P. rotundipenni gracilior, thoracis angulis posticis obtusissimis sed non rotundatis, niger minus nitidus, anguste cupreo-viride marginatus; elytris sat elongato-ovatis late striatis striis opacis lævibus, interstitiis mediocriter convexis æqualibus, 3o, 5to, et 7mo longe ante apicem conjunctis. Long. 23 millim.

Hab. Amula, in Guerrero, 6000 ft. (*H. H. Smith*). Two examples.

A distinct species, not closely allied to any hitherto described. The outline of the thorax is less semicircular than in *P. rotundipennis*, and more nearly resembles that of *P. subangulatus*; the hind angles, however, are less distinctly pronounced than in that species, without being broadly rounded off, as in *P. rotundipennis*; the sides also are more broadly rounded in the middle, and converge more to the base, where the thorax is much narrower; the basal impressions are faintly marked. The elytra are somewhat elongate-ovate, convex, the striæ wide, not sharply impressed, opaque, and without distinct punctuation; the interstices convex, nearly equal in width, the 8th without the usual row of punctures.

Scarites Durangoensis. (Pl. XIII., fig. 4).

S. texano (Chaud.) proxime affinis; differt elytris subtilissime punctulato-striatis, striis a 5to obliteratis interstitiis planis; niger, politus, palpis, antennis et tarsis rufo-testaceis. Long. 19 millim.

Hab. Villa Lerdo, in Durango (*Höge*).

This might be considered merely a local variety of *S. texanus*, but the nearly smooth and polished elytra give it a distinct facies; the eyes, too, are decidedly less convex, and the head broader behind than in *S. texanus*.

Distichus granulipygus.

D. septentrionali affinis; sat angustus, parum convexus, niger nitidus, elytris parallelis, acute striatis, interstitiis interioribus planis, 6—7 convexis striisque 5—7 latius exaratis, interstitio 8vo,

margine apiceque late granulosis ; stria 3io sexpunctata. Mentum rugulosum gula confluenter punctata; metathoracis episterna granulata. Long. 14—16 millim.

Hab. Cordova, in Vera Cruz ; San Juan Bautista, in Tabasco (*Höge*).

The head and thorax do not differ from the same parts in *D. septentrionalis*, the mandibles having a smooth longitudinal groove, the epistome 4-dentate, with the two median teeth very small and approximated, and the thorax sinuate-angustate towards the base, dentate at the angle, and minutely granulate in the basal depression ; but the elytra differ greatly in their sharply-grooved striæ, broader and deeper towards the sides, with corresponding convex interstices, striæ continuing well-marked to the apex, and in the granulated sides and apex. The transversely grooved ventral segments bring the species within the definition of *Distichus*, but the maxillæ are not much more obtuse than in *Scarites subterraneus*, the hooked apex being less prolonged and acute. The middle tibiæ have only one very distinct subapical spine.

Schizogenius multisetosus.

S. Truquii (Putz.) affinis et similis ; at differt thoracis striis discoidalibus vix ultra medium extensis, elytrorumque interstitiis 3io, 5to et 7to punctis setiferis, in medium interstitium sitis, circa 15; æneus vel æneo-piceus, nitidus, versus apicem plus minusve infuscatus ; antennis, palpis et pedibus rufis ; clypeo tridentato, carinis duabus medianis antice gradatim acuminatis, fronte utrinque 4-carinatis 2 medianis parallelis; elytris parum convexis, acute striatis, striis usque medium punctulatis. Long. 4—4½ millim.

Hab. Huitzo, in Oaxaca; Yautepec, in Morelos (*Höge*).

The chief difference between this species and *S. Truquii* lies in the short discoidal stria of the thorax, which in *S. Truquii* reaches nearly to the fore margin. But to this are added many peculiarities, *e. g.*, the transverse anterior groove of the thorax is smooth (not punctured as in *S. Truquii*) ; the frontal carinæ are not all straight, nor do they terminate before reaching the level of the hind border of the eyes, nor do the middle pair join behind in a curved carina. The 7th elytral stria is

smooth in *S. multisetosus*, punctured like the others (all which are punctured nearly to the apex) in *S. Truquii*. The locality of the latter species is Cuernavaca.

Scythropasus elongatus, Chaud.

Two examples, females, of this species have been received from Dr. Gaumer, taken at Temax, in North Yucatan, and I am indebted to the kindness of M. Sallé for a male specimen, also from Yucatan. All agree well with Chaudoir's description, founded on a unique example "from the interior of Mexico." In the Biol. Centr.-Amer., Col., i., 1, p. 24, an insect from Chontales, Nicaragua, is referred to this species, but it differs sufficiently from the Yucatan species to rank as distinct :—

Scythropasus nicaraguensis.

S. elongato differt colore nigro polito, thorace ad basin dilatato elytrorumque striis mediocriter impressis omnino punctulatis.

Body greatly elongated and sublinear, as in *S. elongatus;* head slenderly oval and very gradually narrowed behind the eyes, which are much less salient than in the allied genera. Thorax narrow, quadrate, but a little the widest at the base. The elytra have smooth, and not, as in *S. elongatus*, finely punctured interstices; the rows of larger punctures are, however, the same. Long. 14 millim.

Hab. Chontales, Nicaragua (*Belt*).

Pelecium subdentatum, Chaud.

Examples of this species were captured by Mr. Herbert Smith at Omilteme, Guerrero, at an elevation of 8000 ft.

Micrixys distinctus, Leconte, Proc. Ac. Nat. Sci., vii., 220; id., Col. of Kansas and Eastern New Mexico, p. 1, t. ii., f. 2.

Hab. Durango City, Aguas Calientes City (*Höge*); New Mexico.

The genus *Micrixys* is an addition to the Mexican fauna.

Chlænius chrysopleurus (Chaud.).

The typical form of this species, with a brilliant coppery or gold-green streak on each side of the disk of the

thorax, and the two marginal interstices of the elytra green, extends through Guatemala and Yucatan to Oaxaca and Chilpancingo, on the Pacific coast of Mexico. The var. *C. cæruleus* (Chaud.), described from Puebla, has been found also at Cuernavaca (but the examples are more frequently brilliant green than blue or green, with blue reflections on the elytra) by Herr Höge, who has also brought home a series of the following variety :—

Var. *C. Guerreroensis*.—Elytra black, but clothed with a more tawny pubescence, which gives the surface a brownish tinge; thorax as in the type, brilliant golden coppery, especially on the convex sides, but sometimes green, with the disk black or wholly green; the green border of the elytra extending, especially towards the base, to the 6th or 5th stria. Long. 13—18 millim. ♂ ♀.

Hab. Chilpancingo and Acapulco, in Guerrero; Mazatlan (*Höge*).

Chlænius ruficauda, Chaud.

A large series of this species was obtained by Herr Höge at Villa Lerdo, in Durango, and Chihuahua City, and an equally large number of the Mexican form at Tehuantepec; the two being strikingly and constantly different in size, width of thorax, and to a minor extent in sculpture, and the degree to which the orange apical spot is sinuated on the suture. The true *ruficauda* is smaller (generally 10 millim.) and more slender, with narrower thorax, more gradually sinuate-angustate behind, and feebly sinuated at the suture. Chaudoir's names, like all the others given in the synonymy, and his description (except as to size) refer to the Californian form, which, according to Leconte's figure, agrees with that of North Mexico; consequently a new name must be applied to the well-defined South Mexican variety or species. Its differential characters are as follows :—

Chlænius cordifer.—Major, thorace latius rotundato, versus basin brevius sinuato, supra sparsius punctato; elytris apice macula magna aurantiaca late cordiformi apud suturam semper fortiter sinuata. Long. 12½ millim.

Hab. Tehuantepec, Oaxaca, Putla.

Chlænius porphyrius. (Pl. XIII., fig. 7).

C. cursori (Chevr.) major, subopacus capite thoraceque paullo nitidis, purpureus capite vel capite et thorace interdum cæruleis; thorace cordato-quadrato sat elongato et planato grosse discrete (disco utrinque paullo sparsius) punctato; elytris elongato-ovatis versus basin gradatim angustatis, punctulato-striatis (punctulis postice obsoletis) interstitiis haud dense punctulatis; partibus oris antennis et pedibus rufis. Caput ovatum, oculis mediocriter prominentibus, post oculos transversim depressum, grosse punctatum, media fronte colloque postice lævibus. Palpi articulis apicalibus fere cylindricis. Labrum truncatum. Abdomen medio sparse lateribus paullo densius punctatum. Episterna (præcipue metathoracica) grosse punctata. Long. 16—18 millim., ♂ ♀.

Hab. Xantipa and Omilteme (alt. 8000 ft.), in Guerrero (*H. H. Smith*).

Allied to *C. cursor*, but of more elongate form, the thorax especially longer, quadrate, before the middle moderately rounded, behind the middle slightly narrowed with gradually sinuated sides, the hind angles outstanding, rectangular, as in *C. Rodriguezi* (Chaud.); the surface is only slightly convex, and the anterior angles (as in *C. cursor*) moderately declivous.

Chlænius eurybates. (Pl. XIII., fig. 8).

C. porphyrio proxime affinis, sat latior et robustior, thorace latiori et postice brevius sinuato-angustato, angulis posticis rectis, supra similariter grosse discrete punctato. Subopacus cyaneus, elytris lateribus vel margine viridibus, interdum capite et thoracis disco violaceis; antennis articulo 3io semper nigro, 1—2 piceo-rufis, 4—11 testaceo-rufis; capite grosse punctato medio late lævi; labro mandibulis pedibusque nigro-piceis; elytris late ovatis versus basin angustatis, striis vix perspicue punctulatis; cæteris sicut in *C. porphyrio*. Long. 16—18 millim., ♂ ♀.

Hab. Omilteme, 8000 ft.; Xucumanatlan, 7000 ft.; Amula, 6000 ft., in Guerrero (*H. H. Smith*).

The thorax varies in outline, examples in which it is narrower and subcordate are purplish violet, at least on the disk of the thorax, and so far resemble *C. porphyrius* in form and colour; but they are distinguishable from that species by the black 3rd antennal joint and pitchy black legs. A single example from Amula has a wider,

transverse thorax, though otherwise agreeing in shape with the others.

Chlænius beatus. (Pl. XIII., fig. 9).

C. glauco (Lec.) affinis; major, convexus præcipue thorace convexiori lateribus fere æqualiter rotundatis sed antice magis quam postice angustato angulis posticis valde obtusis, supra discrete sat minute (disco utrinque sparsius) punctato, foveis basalibus sat elongatis profundis; elytris acute punctato-striatis, interstitiis planis; capite omnino minutissime punctulato; labro arcuatim emarginato. Caput et thorax viridi-ænea nitida, elytra cum epipleuris viridescente-nigra, vel obscure viridia, fusco-pubescentia, partibus oris pedibus antennisque articulis 1—3 testaceo-rufis, his art. 4—11 fusco-rufis. Long. 14—16 millim., ♂ ♀.

Hab. Cuernavaca (*Höge*). Many examples.

The thorax is more elongate than in *C. glaucus*, and its sides much more rounded and less convergent to the base than in *C. tricolor* and allied species. A single example from Tehuantepec has the thorax less rounded on the sides, hence the hind angles are rather less obtuse.

Chlænius amplians.

A *C. beato* differt solum thorace breviori, crebrius et undique punctulato, lateribus equaliter sat fortiter rotundatis, angulisque posticis distinctioribus; capite thoraceque viridi-æneis, elytris viridescenti-nigris, partibus oris antennis pedibusque rufis; labro sat profunde emargiuato. Long. 12—13 millim., ♂ ♀.

Hab. Cuernavaca (*Höge*). Several examples.

Notwithstanding the shorter, more rounded and evenly punctured thorax, besides its smaller side, this form may be only a structural modification of *C. beatus*, found in the same locality. The hind angles of the thorax are more pronounced, and in some of the few examples are preceded by a slight sinuation of the lateral margin, a character which connects it with *C. tricolor;* but the elytra, as in *C. beatus*, are more convex, and the striæ much more finely punctured than in *C. tricolor.*

Chlænius suppletor.

C. beato affinissimus, sed differt thorace paullo grossius et sparsius punctato lateribus regulariter arcuatis, angulis posticis obtusis.

Capite et thorace cæruleis, viridescenti-cæruleis vel violaceis, elytris obscure cærulescenti-nigris; labro late sinuato et capite sicut in *C. beato* minutissime punctulato. Long. 12—14 millim., ♂ ♀.

Hab. Cordova, in Vera Cruz (*Höge*).

This resembles *C. beatus* so closely in the form of the thorax and other characters, that it may be only a local modification of the same stock. There is, however, a good series of each form, and the peculiarities are constant. It is smaller, and the elytra especially are relatively shorter and more rounded on the sides, so that they may be described as oval; whilst in *C. beatus* they are elongate oblong-ovate. The punctuation of the thorax is stronger, and on the disk sparser. The epipleuræ of the elytra and lateral margins of the thorax are deep black.

Dercylus (*Dercylodes*) *mexicanus*.

D. crenato (Schaum.) simillimus, sed certe differt elytris humeris angulatis dentiferis striisque in fundo solum subtilissime punctulatis. Paullo brevior elytrisque minus convexis, fere parallelis; capite thoraceque haud diversis, elytris profunde striatis interstitiisque valde convexis; subtus lævis, tibiis rectis; niger subnitidus palpis rufis. Long. 14 millim.

Hab. Tapachula, in Chiapas (*Höge*). Two examples.

The species belongs, like *D. crenatus*, to Chaudoir's generic group *Dercylodes*, separated from *Dercylus* chiefly on account of the sexpunctate labrum, the latter group having only two punctures. The genus is Tropical South American, this being the first species recorded from north of the Isthmus of Panama.

Dicælus costatus, Leconte, Classif. Carab. U. S., p. 389 (1853); Journ. Ac. Nat. Sci., iv., 1, t. 1, f. 7.

Var. *Lerdoensis*, Villa Lerdo, in Durango (*Höge*). Two male examples, differing in nothing but their larger size (34 millim.), and the somewhat rounded sides of the thorax at the anterior part, which gives a less trapezoidal outline. In six Texan examples of *D. costatus*, received from Belfrage, the size varies from 26—28 millim.

An addition to the Mexican fauna.

Dicælus lævipennis, Lec. (*D. Flohri*, Bates).

Herr Höge's last collection contained a good series of this species from three localities—Mexico City, Toluca, and Refugio in Durango. In the two former, all the examples belong to the variety *Flohri*, oblong, robust, with the sculpture of the elytra limited to one or two (very rarely to three) lines of punctures towards the suture, and the apex subacuminately rounded, the specimens from Mexico being, as a rule, rather longer (22 millim.) than those from Toluca (17—20 millim.). At Refugio the species is much modified, the form being shorter and oblong-ovate rather than oblong in outline, with the apex of the elytra more rounded, and the surface having nine complete but fine rows of punctures. There is, however, among the large series sent by Herr Höge, considerable variation, some individuals being larger and more elongate, with the apex of the elytra less broadly rounded: these form the transition to the smaller examples from Toluca, and come nearest the typical form of *D. lævipennis* from Colorado and Utah; others are remarkably short and ovate, and, if seen apart from transitional grades, would be taken for a distinct species; and this var. may be thus characterised:—

Var. *D. abbreviatus.*—Sat breviter oblongo-ovatus apice late rotundatus, niger subnitidus marginibus interdum viridescentibus; elytris subtiliter striato-punctulatis, carina humerali parum elevata subobsoleta. Long. 14½—17 millim., ♂ ♀.

Hab. Refugio, in Durango (*Höge*).

Anisotarsus purpurascens, Bates.

Numerous specimens of this insect were captured by Herr Höge at Nuevo Laredo, in Tamaulipas.

Anisotarsus hilariolus.

A. cyanippo (Bates) affinis, breviter oblongus, supra (♂ ♀) nitidus metallicus, capite et thorace viridescenti-cæruleis, elytris ænescenti-cupreis (raro toto viridi-æneus); capite sat lato fronte subplanata sutura transversa profunda; thorace transverso, quadrato, ante medio leviter rotundato deinde subrecte et paullo angustato angulis posticis valde obtusis haud vero rotundatis, foveis basalibus fortiter impressis, toto lævi; elytris breviter oblongo-

ovatis politis acute striatis, interstitiis omnino planatis, interstitio 3io unipunctato, 7mo impunctato. Palpi et antennæ fulvo-testaceæ, corpore subtus pedibusque nigris tarsis piceo-rufis. Long. 10½—12 millim., ♂ ♀.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*).

A shining metallic species, like *A. cyanippus*, but the thorax different in form, the sides not being regularly arcuated, but the curvature greatest a little before the middle, and thence very slight, or the sides straight, to the hind angles. This form gives the species the aspect of a *Harpalus* of the group *H. rubripes*. The dilated tarsi in the ♂ are transverse-cordate or broadly triangular, except the first joint, which is narrowly triangular. The species is also closely allied to *A. peruvianus*, Dej., but it is rather more elongate and less convex. From *A. mexicanus*, Dej., which it resembles in form, though smaller and shorter, it differs, besides colours, in the very obtuse hind angles of the thorax.

Anisotarsus virescens, Dej.

Examples of this species have been received from Herr Höge, from Cuernavaca and Salazar.

Harpalus Durangoensis.

H. herbivago (Say) similis, oblongus, convexus, politus, nigro-piceus; antennis palpis pedibusque fulvo-testaceis; thorace paullo transverso quadrato postice leviter angustato, apud basin quam elytris angustiori prope angulos posticos planato, lateribus nullo modo sinuatis, angulis posticis fere rectis sed apice obtusis, margine laterali rufescenti, fovea basali angusta, basi lævi sed interdum vage punctato; elytris crenulatim punctulato-striatis, humeris dentatis plica basali perparum curvata, striola scutellari cum foveola prope striæ 2ndæ basin conjuncta, interstitiis parum convexis, puncto unico juxta striam 2ndam, apice late subsinuatim rotundatis. Long. 7½—9 millim., ♂ ♀.

Hab. Refugio and Ciudad, in Durango (*Höge*).

Harpalus gravis, Leconte, Proc. Ac. Phil., 1858, p. 60.

Hab. Matamoros Izucar, in Puebla (*Höge*); North America, Texas.

There is one example of this species, an addition to the Mexican fauna, in Herr Höge's collection.

Harpalus mexicanus, Chaud.

Found in abundance by Herr Höge at Villa Lerdo, in Durango; also sparingly at Durango City and Paso del Norte.

Pangus caliginosus, Fabr.

Mr. Höge has found this well-known and conspicuous North American species near Chihuahua City.

The genus is an addition to the Mexican fauna.

Cratacanthus dubius, Beauv.

This species, widely distributed in the Atlantic States, has been taken by Herr Höge at Villa Lerdo, in Durango.

Also an additional genus to the Mexican fauna.

Selenophorus aureocupreus.

Angustus, subelongatus, thorace angulis posticis rotundatis, supra æneo- vel aureo-cupreus subnitidus, palpis, antennis articulis 1—2 (cæteris fusco-nigris) corpore subtus pedibusque testaceo-rufis. Long. 7 millim., ♂ ♀.

Hab. Huetamo, in Michoacan (*Höge*). Many examples.

Resembles in form and in the rounded angles of the thorax the smaller and narrower specimens of *Discoderus arcuatus* (Putz.), but the four anterior tarsi of the ♂ are dilated and biseriate-squamulate beneath, and the species therefore belongs to *Selenophorus*. The hind angles, moreover, are not quite so obliterated as in *Discoderus arcuatus;* they are, on the contrary, perceptible as angles, though very obtuse; the sides of the thorax also are not arcuated, the rounding being limited to the front a little before the middle, whence they are (especially in the ♂) nearly straight to the hind angles; the disk is remarkably convex, the space near the hind angles flattened and punctulated, the hind marginal groove not interrupted in the middle. The elytra are sharply striated, the striæ deeper and broad near the apex, the row of punctures near the 2nd, 5th, and 7th small but conspicuous; the apex is subacuminate, with strong sinuation of the subapical margin.

Selenophorus tarsalis, Putz.

Var. *liosomus*.

Differs from the type-form, as found in Mexico and Guatemala, only in its larger size and the more polished and more strongly iridescent surface. The colour is piceous, metallic above, inclining to green on the head and thorax, and brownish coppery on the elytra. The sides of the thorax are arcuated, much more strongly so than in *S. splendidus* (Putz.), the greatest width being just before the middle; the sides become less arcuated, almost straight, towards the base, and the hind angles are well-pronounced, though obtuse; the base has scarcely any punctuation. The interstices of the elytra are smooth to the apex, except the 9th (marginal) and the edge of the 8th, which are finely punctured. The antennæ, parts of mouth and legs, are tawny red, the femora in some examples darker and piceous. Long. 10 millim.

Hab. Temax, in Yucatan (*Gaumer*). Many examples.

Selenophorus bradycelloïdes.

Parvus, nitidus, rufo-testaceus, capite postice, maculis thoracis discoidalibus duabus elytrisque interstitiis 2—6, castaneo-fuscis vix metallicis; antennis articulis 3—4 nigro-fuscis; thorace subcordato-quadrato, postice sinuato-angustato angulis posticis rectis, basi utrinque planato, punctulato; elytris acute striatis, apice oblique modice sinuatis, interstitiis planis (apice vix convexioribus) 3io, 5to et 7mo seriatim punctatis. Long. 5 millim.

Hab. San Juan Bautista, in Tabasco (*Höge*).

This small and distinct species is not recognisable as a member of the genus *Selenophorus* at first sight; the shape and style of coloration being rather those prevailing in *Acupalpus* and *Bradycellus*. The maxillary palpi also are more gradually pointed than in the restricted *Harpalinæ* group, but the rounded punctiform frontal foveæ, the edentate mentum, and the triseriately punctured elytra show that the species is a *Selenophorus*. The punctures are very distinct and deep, but few in number; the row of six on the 3rd interstice lying near the 2nd stria, that of the 5th (five in number) near the 6th and that of the 7th (consisting

of four punctures only) lying in the 8th stria. The two marginal interstices and the apical portions of all are as usual, in *Selenophorus*, thickly and finely punctured.

Selenophorus punctatulus, Putzeys, Biol. C. A., Col., i., 1, p. 62.

Examples of this species have recently been sent by M. Gaumer from Temax, in Yucatan, the State whence the insect described by M. Putzeys was obtained. The species belongs to a group of the genus in which the thorax (except on the disk) and the elytra are closely punctured, a group which connects *Selenophorus* with *Arthrostictus*. The glabrous elytra of *S. punctatulus* may justify the retention of the species in *Selenophorus*, although under the lens a very fine laid pubescence is seen on the sides towards the apex, especially in the females.

S. punctatulus occurs also at Tampico and Minas Viejas. The following is a closely related species :—

Selenophorus dispar.

S. punctatulo paullo major ; differt elytris densius punctulatis in ♀ undique, in ♂ lateribus tantum, fulvo-pubescentibus ; ♂ politus opalescens, ♀ vix nitida. Elongato-oblongus, piceo-niger ; antennis palpis pedibusque melleo-flavis ; thorace lateribus paullo ante medium arcuatis, angulis posticis fere rotundatis, basi late et dense, lateribus et antice sparsius punctulatis, disco glabro. Long. 7½—10 millim.

Hab. Cuernavaca, in Morelos (*Höge*) ; Chilpancingo and Iguala, in Guerrero (*H. H. Smith*).

This species departs somewhat widely from the typical *Selenophori*, and perhaps would be better placed with its allies, *S. paganus*, Dej., *S. rufilabris*, Dej., and *S. rugipennis*, Putz., in the genus *Arthrostictus*. The triseriate punctures of the elytra are very small and liable to be overlooked.

Selenophorus crassiusculus, Putzeys.

This species, recognisable by its robust, convex form and rather long suboval thorax, with hind angles broadly rounded, is met with—its typical state—in Oaxaca, and at Cuernavaca, Yautepec, Tehuacan, in Puebla, and

Ventanas, in Durango. All the examples have clear reddish-tawny antennæ (slightly browner in some Ventanas specimens), and palpi and reddish tarsi, the labrum in some cases being also tawny red. Putzeys gives 10 millim. as the size. In a large series taken by Herr Höge the length varies only between 10 and 11½ millim. The thorax never assumes the subcordate form, that is, distinctly broader before the middle, the arcuation of its sides being generally regular; but the degree of arcuation varies much, and in the smaller examples the widest part is a little before the middle, with the sides thence to the base a little straighter than in all the larger and more typical specimens, so that there is little to distinguish them from *S. arcuatus* (Putz.) except the unicolorous reddish antennæ and somewhat longer thorax. In the ♂ the four anterior tarsi have four dilated joints, the sides of the 2nd—4th only being clothed with hair-scales; the middle tibiæ are slightly arcuated, but not denticulate on the inner side. The species therefore belongs to *Selenophorus*, although its facies and form of thorax are those of *Discoderus*.

Var. *S. nigrescens*.—Rather smaller (9 millim.); legs (including tarsi) and antennæ black, joints 1—2 red; palpi dull reddish, more or less varied with black. Thorax nearly as in the type-form.

Hab. Irapuato, in Guanajuato; Mexico City; Aguas Calientes City; Atenquique, in Jalisco (*Höge*).

A good series of examples. This form seems to be a transition stage between *S. crassiusculus* and *S. arcuatus*. A dark blue variety of *S. nigrescens* is not uncommon.

Selenophorus arcuatus, Putzeys (nec *Discoderus amblyderus*, Bates, Biol. Centr.-Am., Col., i., 1, p. 63).

Putzeys distinguished this species from his *S. crassiusculus* by its smaller size (7½ millim.), black antennæ, with the two first joints red, and the broader, more transversal, and less rounded thorax. These characters are found in a species of which I have seen many examples from the neighbourhood of Mexico City, and which in some individuals, where the sides of the thorax are more arcuated than usual, are scarcely distinguishable from the smaller specimens of *S. crassiusculus* var. *nigrescens*. When I referred *S. amblyderus* to the same

species, I had not seen any examples of the male of *S. arcuatus*, many of which have since been received and prove to have four dilated joints to the four anterior tarsi, with the soles of joints 2—4 only squamulose, and simple middle tibiæ, precisely as in *S. crassiusculus*. Putzeys' species must therefore be retained in the genus *Selenophorus*. *D. amblyderus*, on the other hand, which in the ♀ is with great difficulty distinguishable from *S. arcuatus*, has in the ♂ simple anterior tarsi, and the middle tibiæ armed on the inner side with a row of blunt denticulations, and is consequently a *Discoderus*, though the middle tibiæ are not more arcuated than in the ♂ of *Selenophorus crassiusculus*. Long. 7½—9 millim.

The synonymy will stand thus :—

Discoderus amblyderus.

= *Selenophorus* id., Bates, Proc. Zool. Soc., 1878, p. 591.

Discoderus arcuatus, id., Biol. Centr.-Am., Col., i., 1, p. 63 (nec *S. arcuatus*, Putz.).

Mexico City, Aguas Calientes, Jalapa; Durango City, Cuernavaca.

The thorax is, in the majority of the individuals, decidedly shorter than in *S. arcuatus*, and is more narrowed behind, but the arcuation of the sides varies greatly.

Discoderus dislocatus.

D. acinopoïdi (Bates) affinis et similis, differt colore piceo-fusco vix æneo-tincto striolaque scutellari brevi, obliqua, cum stria 2nda conjuncta et a foveola umbilicata separata. Facies *Acinopi*, oblongus, convexus politus ænescenti-fuscus, palpis antennis tarsisque testaceo-rufis ; thorace lævi quadrato, postice perparum angustato et lateribus paullulum rotundatis, angulis posticis rotundatis ; elytris breviter oblongis acute striatis, punctorum triplici serie minutis vix perspicuis, striis 2nda, 5ta et 7ta contiguis. ♀ tibiæ intermediæ paullo curvatæ intus simpliciter ciliatæ ; ventris segmentum apicalen utrinque bipunctatum. Long. 12 millim., ♀.

Hab. Durango City (*Höge*).

In form of body and in the simple and slight curvature of the middle tibiæ agrees with *D. acinopoïdes* of the same sex, but differs in the elytra not being metallic cupreous, as in that species, and in the curious dislocation of the scutellar striole, which in *D. acinopoïdes*, as in other allied species, proceeds from the basal umbili-

cated foveole, and in *D. dislocatus* proceeds from the 2nd stria at a distance behind the foveole. The difference must be admitted to be very slight, but, being constant in the four examples (all females, like the single specimen of *D. acinopoïdes*), it appears to be of specific significance.

Stenolophus plebejus, Dej., Sp. Gén., iv., p. 424.

Hab. San Juan Bautista, in Tabasco (*Höge*).

Herr Höge obtained numerous examples, all females, of this species; an addition to the Mexican fauna. They differ in nothing but their little larger size from specimens received from Pennsylvania and New York. In all the numerous examples I have seen the elytra become gradually more rufous towards the sides, especially near the apex, a feature not mentioned by Dejean. The species is very closely allied to the common European *S. vespertinus*, but is sufficiently distinct in the colour of the elytra, and in the antennæ having always two basal joints rufous.

Stenolophus lamprotus.

S. vespertino quoad formam similis, sed major elytrisque disco lætissime opalescentibus. Rufus, ventro infuscato, capite nigro, elytris interstitiis 2—4 (medio 2—5 vel 2—6) nigris politissimis, iridescentibus, limbo castaneo-rufo. Antennæ pallide rufæ articulis 3—11 vix perspicue infuscatis. Thorace relative angusto, postice angustato, angulis posticis omnino rotundatis, fovea utrinque basali lata parum impressa sparsim punctulata. Long. 6½ millim.

Hab. Villa Lerdo, in Durango (*Höge*). Two examples.

Agonoderus pallipes, Fabr., Dej.

Hab. Paso del Norte, in Chihuahua, and Villa Lerdo, in Durango (*Höge*).

This genus is new to the Mexican fauna. The species, of which only three examples were sent, agrees with numerous boreal American specimens apparently of *A. pallipes*, with which I have compared it.

Bradycellus Flohri, Bates, Biol. C.-A., Col., i., 1, p. 72.

Var. *denigratus*.

A good series of this apparently local modification of *B. Flohri* was obtained by Herr Höge at Ciudad, in Durango. It agrees with the type in its narrow subelongate form, and in the obsolete hind angles of the thorax with rather strongly punctate basal foveæ. The hind angles of the thorax are, however, more completely rounded, and the form therefore may really be specifically distinct. The colour above and beneath is deep black or pitchy black, and only in immature examples shows a rufous tinge along the suture and lateral borders of the elytra, and the lateral margins of the thorax. The antennæ are nearly black, with the basal joint only red, the second sometimes pitchy red. The legs are pitchy red, with the femora generally darker. The palpi also are dark piceous, with the tapering part of the apical joints more or less pallid. Long. 4½ millim.

Celia californica, Dejean, Sp. Gén., iii., p. 474.

This common Californian species was recorded by Putzeys as occurring also in Sonora, and was accidentally omitted as a Mexican species in the 'Biologia.' Herr Höge has since met with it in Durango (near Ciudad), and at Chihuahua City and Paso del Norte. His specimens range in size from 8 to 10½ millim., and on the average are therefore larger than the very closely allied *C. mexicana*, which varies from 7½ to 9 millim. On comparing a large series of both, among which are several examples from California, I find no difference whatever in form or sculpture, and nothing remains but the prevailing darker antennæ (from the 3rd joint) and darker legs to distinguish *C. mexicana* from *C. californica*, nearly all of which have clear tawny red antennæ, palpi, and legs. As examples with reddish antennæ and legs occur among darker ones in various Mexican localities, *C. mexicana* can only be considered an imperfectly segregated subspecies of *C. californica*.

Celia Hœgei, Bates, Biol. C.-A., Col., i., 1, p. 77.

Further examples of this species have been received. It is easily recognisable by its constantly black, rarely

bluish or brassy black, colour, and the black legs, palpi, and antennæ, the two basal joints of the last-named only being red. It is a little smaller and rather more oblong than the equally, but more sooty, black *C. mœrens* (Zimm.), which is distinguished also by its antennæ being wholly black, with the basal joint only (very rarely the second also) dull red.

The following appears to be nothing but a local colour variety of *C. Hœgei* :—

Var. *C. civitatis*.—Oblong-ovata læte cuprescenti-ænea interdum obscure fuscescenti-ænea, cyanea vel violacea; pedibus sæpe rufescentibus. Long. 8—9 millim.

Hab. Ciudad, in Durango (*Höge*).

A good series of examples, in all of which the two basal joints of the antennæ are red, the rest and the palpi black. The sculpture of the upper surface offers no constant difference from *C. Hœgei* or from *C. californica* and *C. mexicana*, but the exterior striæ of the elytra are frequently more faintly impressed.

Celia tenebrionella, Bates, Biol. C.-A., Col., i., 1, p. 77.

Var. *æneicolor*. — Supra cuprescenti-ænea. Long. 7 millim., ♂ ♀.

Hab. Ciudad, in Durango (*Höge*). A good series of specimens.

This Ciudad form of the black *C. tenebrionella* bears the same relation to its type as the metallic *C. civitalis* in the same locality bears to *C. Hœgei*. The basal joint only of the antennæ is red, the rest of the antennæ, the palpi, and legs being black. There is very little difference between *C. tenebrionella* and *C. Hœgei*, except in size, the latter being 8—9 millim., but I have seen no intermediate examples.

Celia Ciudadensis.

Oblongo-ovata, niger subænea vel (immatura ?) pallidius fusco-ænea; palpis antennis pedibusque fulvo-rufis; thorace sicut in *C. infima* versus basin haud latiore, lateribus leviter arcuatis, basi plus minusve punctata, utrinque foveis duabus sat profundis (exteriori rotundato); elytris striatis stria scutellari juxta basin

a 2nda incipienti, simplici, interstitiis planis 9o angusto. Long. 8 millim., ♂ ♀.

Hab. Ciudad, in Durango (*Höge*).

The arcuated sides of the thorax would render this species almost equally well placed in the genus *Leiocnemis*, but the base is not distinctly narrowed; the arcuation of the lateral margin continues (though becoming slight) to the hind angles, which are obtuse rather than rectangular. In the darker examples the basal half of the terminal joints of the palpi is dark brown.

Celia rectangula, Leconte?.

Hab. Paso del Norte, in Chihuahua (*Höge*); North America, Oregon, California (*Lec.*), Arizona (*Morrison*).

I refer this insect, taken abundantly by Herr Höge, to *C. rectangula*, Lec., with some hesitation; but it agrees with his brief description fairly well. The species is an addition to the Mexican fauna.

Evarthrus substriatus, Leconte, Ann. Lyc. N. Y., iv., p. 344; Proc. Ac. Nat. Sci. Phil., 1873, p. 319.

Hab. Ciudad and Refugio, in Durango (*Höge*).

A large series, varying greatly in size (13 to 17 millim.), and to some extent in form of body, some examples being shorter, with more ovate elytra, like specimens I have seen of this species from Kansas, and others being decidedly more oblong. The elytra are generally very finely striate-punctate towards the suture, but in some examples they are smooth, with only faint traces of striæ under the lens. According to Leconte the elytral striæ are sometimes effaced. Also, like the following, an addition to the Mexican fauna.

Pœcilus chalcites, Say.

Herr Höge captured a specimen of this boreal American insect at Paso del Norte.

Euchroa chrysophana. (Pl. XIII., fig. 10).

E. dimidiata (Chaud.) proxime affinis; paullo minor et angustius oblonga, supra læte cuprescenti-æneа viridi-relucens; antennis

et pedibus piceo-rufis, palpis pallidioribus femoribusque obscurioribus; subtus nigra. Thorax quadratus ante medium paullo rotundatus, angulis posticis rectis interdum subacutis, basi utrinque fovea lineari profunda, inter foveam et angulum planata, foveola minori parum impressa. Elytra subtiliter striata striis interioribus 3 interruptis et in lineolas dissolutis, omnibus usque ad apicem, 6to et 7mo fortiter, impressis; interstitiis planis impunctatis, marginali cum elytrorum apice subtiliter alutaceis; humeris valide dentatis, striola scutellari nulla. Long. 10—11 millim., ♂ ♀.

Hab. Omilteme, in Guerrero (*H. H. Smith*).

The thorax varies in outline in this species and in *E. dimidiata*, and the striæ are equally fine in both, with a tendency in those near the suture to break up into punctures or short lineoles. The difference in the colour of the upper surface is, however, constant throughout a fair series of each, the head and thorax being, in *E. dimidiata*, always strongly contrasted in colour (metallic-green) with the elytra, which vary from coppery red to golden green. The mesosternal process in *E. chrysophana* is immarginate at the apex, in *E. dimidiata* (which Chaudoir places in the section of the genus having a margined prosternum) it is variable, the margin being often feeble, and in some examples quite obsolete. The apical ventral segment in both sexes has two large foveæ; the four foveæ of the ♀ is not therefore a generic character, as stated by Chaudoir.

Loxandrus rubricatus.

L. infimo (Bates) proxime affinis sed elytrorumque apice vage rufo-maculato. Elongatus niger nitidus elytris parum opalescentibus, elytris apice cum epipleuris castaneo-rufis; antennis palpis et pedibus fulvo-rufis. Thorax quadrato-cordatus, postice sinuatim leviter angustatus, angulis posticis subacutis, ad basin sparsim punctatus. Elytra dorso depressa, punctato-crenato-striata versus apicem striis et punctis minus late impressis ibique interstitiis planioribus et (♀) subtiliter alutaceo-strigosis; humeris rotundatis, apice perparum sinuatis. Long. 10 millim., ♀.

Hab. Chilpancingo, in Guerrero (*Höge*).

Very closely allied to *L. infimus* (Biol. C.-A., Col., i., 1, p. 87), of which we have received, since the description was published, further examples taken at San Juan Bautista, in Tabasco, by Mr. H. H. Smith, some of

which are nearly as large (8½ millim.) as *L. rubricatus*. The sculpture of the elytra and peculiar fine striation of the apical portion in the ♀ are the same in both species. The acute outstanding hind angles of the thorax are also nearly the same, but the thorax is a little longer relatively in *L. rubricatus*. There remains for the chief distinctive character the bronzy red vaguely-defined long oval spot near the sutural interstices, and the similarly coloured apical border and epipleuræ.

Morio cyclomus, Chaudoir, Bull. Mosc., 1854, ii., p. 328.

Hab. Teapa, in Tabasco (*H. H. Smith*).

This species has previously been recorded from Columbia, the Upper Amazons, Pará, and Minas Geraes, in South Brazil, but not from Central America.

Calathus gregarius, Say.

Specimens of this insect were captured by Herr Höge at Refugio and Ciudad in Durango, Real del Monte in Hidalgo, and La Noria in Sinaloa. The species was doubtfully included by me in the Mexican fauna on p. 279 of the Coleoptera of the Biol. Centr.-Am., vol. i., pt. 1.

Calathus ambigens.

C. mexicano (Chaud.) affinissimus, sed differt thorace haud postice angustato, lateribus rufo-translucentibus paullo explanato-reflexis. Piceo-niger leviter æneo-tinctus, antennis palpis pedibus margineque laterali prothoracis rufescentibus, thorace quadrato apud basin paullulum latiori quam ad apicem, lateribus plus minusve arcuatis, basi versus angulos obtusissimos planata, puncto setifero magno conspicuo; elytris striis hic illic indistincte punctulatis, interstitiis planis 3—4 punctato. Long. 8—9 millim., ♂ ♀.

Hab. Ciudad, in Durango (*Höge*).

Rather more elongate and slender in all its parts than *C. mexicanus*, and with constantly paler rufous antennæ and legs. The thorax differs in being broader behind, and having rufo-translucent lateral margins. It resembles the European *C. micropterus*, but is larger.

Pristodactyla impunctata, Say, Trans. Am. Phil. Soc., ii., p. 45; *P. Americana*, Dej., Sp. Gén., iii., p. 83.

Hab. Ciudad, in Durango (*Höge*).

This genus is an addition to the Mexican fauna.

Anchomenus (*Agonum*) *megillus.*

A. alyconeæ affinis sed multo major, præcipue elytris magnis latius oblongis. Caput et thorax relative parva, supra viridi-ænea polita, hoc rotundato, lateribus et margine basali versus angulos posticos sat alte reflexis, ibique dorso concavo et in concavitate fovea profundiori impresso, angulis rotundatis. Elytra viridi- vel cuprescenti-ænea, acute striata, interstitiis planis tertio punctis 4—5 grossis partim in medio interstitio sitis. Subtus piceo-niger, pedibus sordide testaceis femoribus versus apicem, tibiis et tarsis partim, infuscatis. Antennæ et palpi fusco-nigra. Long. 10—11 millim.

Hab. Villa Lerdo, in Durango (*Höge*). Many examples.

Anchomenus cyclifer, Bates.

Found in profusion by Herr Höge at Villa Lerdo, in Durango.

Elliptoleus olisthopoides.

E. flavipedi (Dej.) affinis et similis, nigro-fuscus æneo-tinctus, antennis palpis et pedibus fuscis vel fusco-rufis, thorace subcyathiformi ab angulis anticis usque ad basin curvatis et angustatis angulis posticis nullis ibique margine leviter reflexo, elytris striis omnibus sat acute impressis et subpunctulatis. Long. 6½—7 millim.

Hab. Ciudad, in Durango (*Hoge*).

Very closely allied to *E. flavipes* and *E. vixstriatus*, but well-distinguished by the fine distinctly impressed elytral striæ and darker colour of the legs.

Colpodes haptoderoides. (Pl. XIII., fig. 11).

C. pterostichoïdi (Bates) et *C. orthomo* (Chaud.) affinis et subsimilis. Sat breviter oblongus parum convexus piceo-niger nitidus, palpis antennis, tibiis et tarsis testaceo-rufis. Caput ovatum post oculos gradatim angustatum. Thorax elytris paullo angustior, quadratus antice magis quam postice angustatus, paullo ante

medium rotundato-dilatatus deinde usque ad basin sinuatus, angulis posticis exstantibus acutis; angulis anticis acutis, lateribus et basi prope angulos sat late planatis, margine tenui, interdum rufo-translucenti. Elytra subpunctulato-striata striis versus apicem grossius exaratis, interstitiis planis, tertio bipunctato, puncto primo prope medium (interdum deficiente) raro tripunctato; basi utrinque fortiter arcuata, humeris porrectis haud vero dentatis; stria prima ad basin attingenti ibique in foveam desinenti; prope apicem sat fortiter sinuata. Metasterni episterna brevia. Tarsi graciles, 4 postici lateraliter sulcati; 4 anteriores articulo 4to brevissime bilobato, lobis paullo inæqualibus. Palpi articulo apicali graciliter fusiformi apice vix perspicue truncato. Thoracis puncto setifero posteriori in margine ipso anguli sito. Long. 10—12 millim., ♂ ♀.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*). A large series of examples.

In *C. pterostichoides* the elytra have a coppery tinge, and are much more finely striated; the thorax, though essentially similar in shape, differs conspicuously in being less narrowed in front of the anterior dilatation, with less acute angles, so that it is as broad at the base as at the apex, and the hind tarsi are flattened above, and hence appear broader.

Colpodes harpaloides. (Pl. XIII., fig. 12).

Sat breviter oblongus, politus, ænescenti-niger, elytris cupreis, antennis palpis et tarsis obscure piceo-rufis. Caput late ovatum; antennæ breves. Thorax transverse quadratus lateribus mediocriter arcuatis et explanato-reflexis, postice nullo modo sinuatis sed angulis posticis breviter exstantibus subrectis, puncto-setifero supra angulum. Elytra oblonga parum convexa basi utrinque paullo arcuata ad apicem distincte sinuata, subtilissime subpunctulato-striata, interstitiis planissimis tertio tripunctato. Metasterni episterna brevia latitudine basali haud longiora. Tarsi 4 postici supra paullo depressi utrinque sulculati articulo 4to brevissime inæqualiter bilobato. Long. 11 millim.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*). Three examples.

A species not closely allied to any other known to me in the genus. The head has the usual two supra-orbital setæ.

Colpodes steropoides. (Pl. XIV., fig. 1).

C. sphodroïdi (Chaud.) affinis sed magis convexus, elytris relative brevibus ovatis. Niger nitidus; caput paullo latius ovatum, oculis paullo prominentibus; seta supraorbitali anteriori deficienti, Thorax late ovatus postice multo magis quam antice angustatus, angulis anticis obtusis sed a collo distantibus, posticis omnino rotundatis puncto-setifero posteriori deficienti. Elytra tenuiter striata, interstitiis planis tertio 3-punctato, margine basali recto, angulis humeralibus obtusissimis, apice rotundata nullo modo sinuata. Antennæ, palpi et tarsi obscure rufo-testacea. Metathoracis episterna brevia latitudine anteriori haud longiora. Tarsi omnes articulo quarto angulis sat longe inæqualiter productis; 4 postici lateraliter sulculati, articulo unguiculari glabro. Long. 10¼—12 millim.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*). Many examples.

Agrees rather better with Chaudoir's description of his *C. biovatus* than the typical specimen of that species in the Sallé collection does, with the exception that in our species the thorax is strongly narrowed behind, and not equally narrowed behind and before, as stated by the describer. In facies *C. steropoides* resembles a small *Steropus*, e. g., *S. Illigeri*, except that the elytra are more ovate. In the singular absence of the anterior supra-orbital seta it agrees with *C. sphodroides*, but in facies the two species are wholly dissimilar.

Colpodes platysmoides. (Pl. XIV., fig. 2).

Elongato-ovatus fuscus supra æneo-tinctus nitidus, palpis antennis et pedibus rufis. Caput breviter ovatum, setis supraorbitalibus duabus. Thorax elongatus subquadratus ante medium mediocriter rotundatus postice gradatim, versus basin sinuatim, angustatus, angulis posticis distinctis sed obtusis margine basali prope angulum obliquato, lateribus mediocriter explanato-reflexis prope angulum posticum planatis, angulo haud elevato. Elytra ovata convexa, basi utrinque valde arcuata, humeris acutis, apice valde sinuata; exarato-striata prope apicem striis fortioribus, interstitiis planis tertio tripunctato, 6to 7mo et 8vo postice longitudinaliter concavis. Metathoracis episterna brevia paullo transversa. Tarsi graciles, 4 postici fortius sulculati, articulo 4to graciliter triangulari angulis inæqualiter breviter productis, articulo

5to subtus glabro. Antennæ elongatæ, graciles. Long. 12 millim., ♂ ♀.

Hab. Omilteme and Xantipa, in Guerrero (*H. H. Smith*).

The metathoracic episterna are nearly as in *C. mæstus* (Dej.), shorter and broader than in *C. transfuga* (Chaud.), and are shorter than the width at the base. The upper surface is very dark brown, glossy, and with a brassy tinge, the under side with the elytral epipleuræ being lighter, almost tawny brown. The facies is that of certain species of *Platysma*. The posterior thoracic seta is apparently absent.

Colpodes omaseoides. (Pl. XIV., fig. 3).

Elongato-oblongus nullo modo ovatus, niger nitidus, antennis palpis et tarsis obscure rufis. Caput ovatum tumore post-oculari elongato postice angustato, sulco posteriori sat profundo; setis supra-orbitalibus duabus. Thorax quadratus, lateribus explanato-reflexis plus minusve rotundatis, interdum subcordatus, post medium sub-sinuatim angustatus, angulis posticis breviter prominentibus, puncto setifero in margine ipso juxta angulum sito. Elytra postice convexa ad basin utrinque leviter arcuata, apud humeros subdentatim angulata, margine subapicali haud sinuato, parum profunde striata, interstitiis paullo convexis, tertio tripunctato. Metathoracis episterna brevia. Tarsi 4 postici lateraliter sulculati, omnes supra paullo depressi et sparse setosi, articulo 4to angulis paullo productis inæqualibus, 5to subtus ciliato. Antennæ minus elongatæ. Long. 11½—12½ millim., ♂ ♀.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*). A good series of examples.

Although superficially so similar to *C. steropoides*, this species, as will be remarked on comparison of the descriptions, differs in numerous points of structure of high importance. The posterior tactile seta of the thorax is implanted on the thickened edge very near the hind angle, in which it produces a slight notch, as in many other species of *Colpodes*.

Colpodes valens. (Pl. XIV., fig. 4).

C. mæsto (Dej.) affinis, major robustior et magis politus. Oblongo-ovatus haud elongatus, niger nitidus elytris cyanescentibus, palpis antennis et tarsis rufiscentibus. Caput sat gracile ovatum.

Thorax late ovatus, angulis anticis prominentibus, posticis obtusissimis sed distinctis, margine basali prope angulum valde obliquato, lateribus explanato-reflexis ad medium rotundatis, ante basin leviter sinuatis. Elytra ovata, basi arcuato versus humeros ascendenti, humeris subacutis, apice obtuse rotundata paullulum sinuata; fortiter striata striis omnibus integris, interstitiis paullo convexis tertio tripunctato. Metathoracis episterna latitudine basali haud longiora. Tarsi 4 antici articulo 4to brevissime bilobato, 2 postici angulis paullo productis inæqualibus; 4 postici utrinque sulculati dorso subcarinati; omnes articulo unguiculari subtus ciliato. Long. 13 millim., ♂ ♀.

Hab. Ciudad and Refugio, in Durango (*Höge*). Many examples.

Colpodes stenos.

C. lugens (Dej.) affinis; multo angustior, gracile oblongus supra depressus. Piceo-niger, palpis antennis et tarsis fulvo-rufis, supra sericeo-subopacus sed sæpe nitidus. Caput ovatum relative parvum nec sicut in *C. lugens* late ovatum. Thorax sat angustus quadratus, ante medium mediocriter dilatato-rotundatus, post medium sinuatus vix angustatus, angulis posticis exstantibus subacutis, seta posteriori juxta anguli apicem sita. Elytra elongato-ovata fere oblonga, depressa, striata striis hic illic subpunctulatis interstitiis paullulum convexis; apice oblique sinuata. Metathoracis episterna brevia, latitudine basali vix longiora. Tarsi 4 postici lateraliter sulculati, omnes articulo 4to lato angulisque obtuse paullo productis parum inæqualibus, articulo 5to subtus tum glabro tum parce ciliato. Long. 9—10 millim., ♂ ♀.

Hab. Toluca, Amecameca, in Morelos (*Hoge*). A large series of examples.

In form and many points of structure intermediate between *C. lugens* and *C. semiopacus*, and closely allied to *C. Forreri* (Bates). The metathoracic epimera are decidedly longer and relatively narrower than in *C. lugens*, and the long and well-marked sinuation of the sides of the thorax and produced hind angles distinguish it from both species. The examples from Amecameca are generally of a deeper black than those from Toluca, the head and thorax being highly polished, and the elytra sometimes subopaque.

Colpodes tinctipennis.

C. mæsto (Dej.) affinis, thorace longius quadrato-cordato, etc. Niger, nitidus elytris plus minusve sericeo-opacis cæruleo- vel violaceo-tinctis; antennis et tarsis obscure fulvo-rufis palpis pallidioribus. Caput sat gracile ovatum, setis supraorbitalibus duabus. Thorace longe post medium sinuato-angustatus, angulis posticis rectis subacutis, puncto setifero in anguli apice sito. Elytra postice convexa subpunctulato-striata, interstitiis subplanis tertio tripunctato; plica basali utrinque arcuata versus humeros acutos ascendenti; apice oblique sinuata. Metathoracis episterna latitudine breviora. Tarsi articulo 5to subtus ciliati, 2 antici articulo 4to breviter bilobato, 4 postici articulo 4to triangulares angulis acutis. Long. 11—12 millim., ♂ ♀.

Hab. Ciudad and Refugio, in Durango (*Hoge*).

Distinguished from the numerous species of the *C. mæstus* subgroup, with sinuated sides and rectangular hind angles of the thorax, by the tactile setæ of the head and thorax being of the normal number, the elytra rather strongly convex behind (not depressed as in *C. stenos*), and the ciliated claw-joint of the tarsi. The elytra have a bluish or violaceous tinge, as in *C. Durangensis* and *C. Forreri*.

Colpodes rectilineus. (Pl. XIV., fig. 5).

C. sphodroïdi (Chaud.) affinis; ab omnibus speciebus differt thorace anguste oblongo lateribus fere rectis. Piceo-niger, nitidus, partibus oris, antennis genubus et tarsis testaceo-rufis. Caput gracile ovatum, oculis haud prominentibus, seta supraorbiculari anteriori deficienti. Thorax capite vix latior, lateribus subrectis interdum medio perparum rotundatis ante basin sinuatis paullo reflexis; angulis anticis haud porrectis, posticis rectis, puncto setifero posteriori deficienti, anteriori ante medium sito. Elytra paullo convexa, ovata, exarato-striata, interstitiis fere planis tertio conspicue tripunctato, basi utrinque arcuata, apice fortiter oblique sinuata. Antennæ minus elongatæ articulo tertio cæteris multo longiori. Metathoracis episterna brevia subquadrata. Tarsi graciles, 4 postici lateraliter vix perspicue sulculata, omnes articulo 4to cæteris latitudine æquali, angulis inæqualiter productis. Long. 11 millim., ♂ ♀.

Hab. Omilteme, in Guerrero, 8000 ft. (*H. H. Smith*); Guerrero (*Baron*).

I have failed to discover any trace of the usual setiferous puncture at or near the hind angles of the thorax in the ten examples in hand of this species The absence of this posterior puncture occurs in a few other Central American species, viz., *C. sphodroides*, *C. championi*, and others, of which I have examined a large number, and in which the anterior puncture is always present. In the allied Pacific genera, *Colpodiscus* and *Barypristus*, according to Dr. Sharp, their founder, the posterior puncture is present and the anterior absent, and in *Metronemus* (Sharp) both punctures are wanting. A more remarkable feature of *C. rectilineus* and *C. sphodroides* is the presence of only one supra-orbital seta, the number of setæ, one or two, being a character on which Dr. Horn founds his primary divisions of the main body of the *Carabidæ*.

Colpodes segregatus. (Pl. XIV., fig. 6).

C. chloreo (Bates) et *C. monacho* (Dej.) affinissimus, sed differt thorace ovato angulis posticis rotundatis. Læte viridis interdum elytris disco violaceis, antennis piceis partim rufescentibus, palpis et tarsis pallidioribus. Caput gracile ovatum collo paullo constricto. Thorax ovatus angulis posticis omnino rotundatis lateribus nullo modo sinuatis, puncto setifero in margine elevato a basi remoto. Elytra elongato-ovata, convexa, subpunctulato-striata, interstitiis planis interdum convexis. Metathoracis episterna mediocriter elongata et angustata. Tarsi 4 postici dorso bisulcati, anticorum articulo 4to angulis productis paullulum inæqualibus, 4 posticis triangularibus. Long. 12½—14 millim., ♂ ♀.

Hab. Cuernavaca (*Höge*).

Many examples of this species, or subspecies, were included in the series of *C. chloreus* obtained by Herr Höge at Cuernavaca. The totally different form of the thoracic hind angles (which in *C. chloreus* and *C. monachus* are nearly rectangular, preceded by a well-marked sinuation of the sides, and the setiferous puncture implanted close to the apex of the angle) is almost the only difference. The metathoracic episterna in most of the examples are decidedly shorter, but they are a little variable in length in *C. chloreus*. There are no intermediate forms in the series.

Colpodes Trujilloi.

C. fratello (Chaud.) affinis sed multo minor et minus elongatus. Capite et thorace nigro-æneis, illo parvo, oculis magnis haud vero valde prominentibus, hoc parvo quadrato lateribus anguste explanato-reflexis, ante basin paullulum sinuatis angulis posticis distinctis sed obtusis, margine basali prope angulum obliquato. Elytra saturate viridi-ænea, oblonga parum ovata humeris fere rotundatis angulis obtusissimis; apice longe sinuata, striata, striis versus apicem latius exaratis, interstitiis planis tertio tripunctato. Subtus niger; pedes nigro-ænei, coxis, trochanteribus, tarsis et antennis fulvo-piceis, his fusco-maculatis; palpi fusci apice fulvi. Metathoracis episterna longissima. Tarsi graciles, lateraliter sulculati; 4 postici articulo 4to unilobato. Long. 8 millim., ♂ ♀.

Hab. Jalapa (*M. Trujillo*).

Colpodes æneicauda.

C. semirufo (Motsch.) et *C. inopi* (Chaud.) affinis. Major, supra piceo-niger politus, elytris obscure viridi-æneis versus apicem aurato-æneis, subtus fuscus femoribus nigro-piceis; antennis palpis thoracis lateribus et tarsis obscure fulvis. Caput parvum. Thorax trapezoidalis, disco transversim ruguloso, lateribus (cum angulis posticis) explanato-reflexis, angulis posticis subrectis (margine laterali ante angulum paullo rotundato). Elytra relative elongata et ampliata, apice suturali sublobato-producto, ante apicem lateribus fortiter sinuatis; exarato-striata, interstitiis planis, tertio tripunctato. Metathoracis episterna valde elongata. Tarsi plantis dense ciliatis, 4 antici articulo quarto brevissime bilobato, 2 postici triangulares, angulis acutis æqualibus. Long. 11 millim., ♂.

Hab. Xucumanatlan, in Guerrero, 7000 ft. (*H. H. Smith*); Guerrero (*Baron*).

Two male examples, one of them from Mr. Harford, taken by Mr. Baron in Guerrero.

Colpodes acutulus. (Pl. XIV., fig. 7).

C. variabili (Chaud.) affinis et similis, sed multo minor et differt palpis apice haud truncatis, articulo ultimo fusiformi apice acuminato etsi paullulum obtuso. Castaneo-fuscus, politissimus, elytris viridi- vel cupreo-æneis subtilissime et acute striatis, apice profunde sinuatis parte suturali sublobato-producta. Palpi, antennæ et pedes fulvo-rufa. Caput sat parvum collo subconstricto, oculis prominentibus post oculos sat subito angustatum. Thorax relative

parvus cordato-quadratus, transversus, lateribus explanatis rufo-translucentibus ante basin breviter sinuatis, angulis posticis exstantibus subacutis, reflexis. Elytrorum striæ apice nullo modo profundiores. Metathoracis episterna elongata, angustata. Tarsi gracillimi 4 antici articulo 4to paullo inæqualiter producto, 2 postici triangulares angulis paullo productis. Long. 8 millim., ♂ ♀.

Hab. Zacualtipan, in Hidalgo (*Höge*).

Colpodes columbinus, Chaud.

Herr Höge met with this insect at Jalapa.

Colpodes porrectus, Chaud.

We have received examples of this species from Omilteme, in Guerrero (*Smith*), and Amecameca, in Morelos (*Höge*).

Pogonus (*Diplochætus*) *emaciatus*.

Angustus, sublinearis, rufo-testaceus politus. Caput post oculos incrassatum. Thorax elongatus, postice gradatim angustatus, lateribus paullulum rotundatis, ante basin leviter sinuatis, angulis posticis subrectis etsi baseos versus angulum obliquato, fovea utrinque magna lævi, carinula ab angulo suboblique versus discum extensa. Elytra parallela, sed prope humeros paullo rotundato-angustata, basi thoracis latiora, margine basali interrupto carina valida ab humeri basi usque ad interstitium 5um curvata; sat fortiter punctulato-striata, striis (4ta, 6ta et 7ma exceptis) usque ad basin impressis, duabus marginalibus multo latioribus et longe ante basin conjunctis; interstitiis convexis 3io unipunctato raro bipunctato. Long. 6—6½ millim.

Hab. Mazatlan (*Höge*).

This species seems to be distinct from *P. rutilus* (Chevr.) and *P. parallelus* (Lec.), both belonging to the genus or subgenus *Diplochætus*, the descriptions of which specially mention that the elytral striæ are obliterated at the base, and do not fit the Mazatlan insect in other respects. *P. rutilus* is from Cuba, Colombia, and Venezuela, *P. parallela* is from Texas. *P. depressus* (Lec.), which has the curved humeral carina distinctive of the *Diplochætus* group, differs from our insect in being "strongly depressed," and in having three dorsal punctures.

The genus *Pogonus* is an addition to the Mexican fauna.

Tachys (*Barytachys*) *decastichus.*

T. duplex (Bates) affinis et similis, sed differt inter alia colore supra saturate viridi-æneo. Antennarum articuli 2 basales palpi et mandibulæ pedesque pallide rufo-testacea, corpore subtus nigro-æneo prosterni lateribus interdum castaneis. Thorax transversus antice valde rotundato-dilatatus post medium sinuatim angustatus ante angulos lateribus rectis angulisque postice subacutis; sulco basali lævi fovea utrinque profunda carinulaque obliqua juxta angulum. Elytra convexa punctato-striata, striis utrinque quinque suturali haud profundiori, 2—5 ante apicem abbreviatis (5a perparum abbreviata) spatiis apicali et laterali lævissimis, stria 3ia grosse bipunctata, puncto primo ante, secundo post, medium, striola recurva recta obliqua. Long. 2½ millim.

Hab. Teapa, in Tabasco (*H. H. Smith*).

Pericompsus Tabasconus.

P. stictico (Bates) affinissimus, at differt semper elytrorum maculis majoribus primaque (subhumerali) usque ad striam 3iam vel 4tam extensa. Nigro-æneus antennarum articulis 1—3 partibus oris pedibusque flavo-testaceis. Gracile ovatus. Thorax parum transversus antice mediocriter rotundatus, angulis posticis subacutis. Elytra convexa, utrinque striis punctulatis sex, exterioribus ante apicem abbreviatis, interstitio 3io bipunctato; macula flava subhumerali a margine laterali (ibique lata et elongata) usque ad striam 3iam vel 4am extensa, macula apicali magna obliqua. Long. 2½ millim.

Hab. Teapa (*H. H. Smith*) and San Juan Bautista (*Höge*), in Tabasco.

There is no difference that I can detect between this species and the Guatemalan *P. sticticus*, except in the dimensions of the yellow elytral spots, which in the latter are much smaller, the anterior one narrow and confined to the marginal interstice. It is, however, constant in its difference throughout a large series of examples, and merits a distinguishing name, if only as a local variety.

Bembidium sphærulifer.

B. Championi simile, æneum politum elytris utrinque 7-striatis stria septima brevissima; differt antennis 5—11 et 4to apice nigro-

fuscis, articulis basalibus palpis et pedibus rufo-testaceis, tarsis infuscatis. Thorax sicut in *B. Championi*, *B. sphærodero* et affinibus latus, sphæroidalis; elytris sat grosse punctato-striatis, striis 2—7 gradatim brevioribus. Long. $3\frac{3}{4}$—4 millim.

Hab. Ventanas and Ciudad, in Durango (*Höge*).

Two examples only. These, *B. sphæroderum* and *B. Championi*, are so closely allied that they may hereafter prove to be only modifications of one variable species.

Bembidium (*Peryphus*) *macrogonum*.

B. mexicano (Dej.) proxime affine, sed differt thoracis angulis posticis prolongatis exstantibus carinulaque rectiori usque ad basin (juxta angulum) extensum. Cyaneo-viride politum, antennarum articulis 1—2, palpis ad basin pedibusque flavo-testaceis (tibiis paullo obscuris), elytris prope apicem macula obliqua transversa rufo-testacea. Thorax antice sat late rotundatus lateribus ante basin valde sinuatis, angulis posticis exstantibus, basi dilatata latitudini majori anteriori fere æquali, sulculo marginali laterali angusto usque ad angulum posticum ducto carinulaque recta. Elytra dorso planata, striis punctulatis sex interioribus (præcipue in individuis minoribus) usque prope apicem impressis. Long. $5\frac{1}{2}$—6 millim.

Hab. Cordova, in Vera Cruz (*Höge*). Five examples.

Bembidium (*Peryphus*) *erosum*, Motschulsky, Bull. Mosc., iii., 127; *Mannerheimii*, Leconte, Ann. Lyc. N. York, v., 190.

Hab. Chihuahua City (*Höge*); Paso del Norte (*Flohr*); North America; California.

A large series of examples offering very little variation in markings or in size ($8\frac{1}{2}$ millim.), and differing in no essential respect from Californian representatives of the species. It resembles very closely large examples of *B. mexicanum* var. *Sallæi*, in which the elytra have a large humeral reddish spot, or the colouring is spread over the whole base of the elytra, a form which occurs in Oaxaca, near Mexico City, and in the same locality as *B. erosum*, viz., Chihuahua City. *B. erosum* may, however, be distinguished by the shallower fovea and thickly punctured base of the thorax, and the absence of all trace of the short oblique carina near the hind angle, which, though sometimes very faint, is never

entirely wanting in *B. Sallæi*. The species is an addition to the Mexican fauna.

Bembidium (*Peryphus*) *ciudadense.*

B. erosum (Motsch. = *B. Mannerheimi*, Lec.) differt thorace late rotundato, etc. Caput et thorax nigro-ænea, elytris castaneo-rufis, vitta lata (interdum latissima) suturali (in individuis immaturis deficienti) nigricanti, palpis antennis et pedibus obscure rufo-testaceis femoribus subtus infuscatis, corpore subtus cum coxis piceo-nigro. Caput lævissimum sulcis frontalibus latis profundis. Thorax late cordatus antice late ampliato-rotundatus postice sat valde angustatus, lateribus ante angulos subacutos sinuatis; supra toto lævis, politus, sulculo marginali-laterali angusto usque ad angulos et foveam parvam basalem continuato, carinula nulla, spatio inter foveam et angulum subconvexo lævi. Elytra elongato-oblongo-ovata, utrinque striis punctatis mediocriter impressis sex, 2—6 am versus apicem fere obsoletis. Long. 8 millim., ♂.

Hab. Ciudad, in Durango (*Hoge*).

Many examples, but nearly all immature. One was sent to me by Mr. Flohr with insects from the neighbourhood of Mexico City; I have it so labelled in my collection, but strongly suspect it has been referred to that locality by mistake.

Bembidium lævigatum, Say, Trans. Am. Phil. Soc., ii., 84.

Paso del Norte, Chihuahua (*Höge*).

An addition to the Mexican fauna.

Bembidium Durangoense.

B. nitidulo (Dej.) valde affine; differt inter alia femoribus viridi-æneis. Subtus splendide viridi-æneum supra æneo-cupreum minus nitidum, antennarum articulis 1—3 et 4to basi rufo-testaceis cæteris nigris, femoribus ad basin (cum trochanteribus) tibiis tarsorumque articulo basali (cæteris nigro-fuscis) testaceis. Caput sulcis frontalibus rectis subangustis. Thorax subquadratus medio perparum rotundato-dilatatus antice gradatim, postice minus et sinuatim angustatus, angulis posticis exstantibus acutis. Elytra oblongo-ovata passim sat grosse subcrenatim punctato-striata interstitiis paullo convexis æqualibus 3io punctis mediocribus duobus. Elytrorum striæ 8—9 arcte approximatæ. Long. 6—6½ millim.

Hab. Villa Lerdo, in Durango (*Höge*).

From *B. coxendix* (Say), a species belonging to the same subgroup of *Bembidium*, our species differs in the conspicuously longer and narrower thorax. In colours and sculpture there is little difference.

Anchonoderus fulvipennis.

A. subtili (Bates) affinis. Nigro-æneus, elytris (cum epipleuris) castaneo-fulvis apice late, et interdum lateribus, nigris; antennis (versus apicem obscurioribus) palpis pedibusque rufo-testaceis. Oculis sicut in *A. subtili* et *æneicolli* magnis prominentibus. Caput fere læve, nitidum, collo leviter constricto, inter antennas breviter et late bisulcatum. Thorax relative parvus, cordatus post medium angustatus ante angulos parvos reflexos breviter sinuatus, margine basali versus angulos obliquato; indistincte rugulosus parum nitidus dense erecte pubescens. Elytra oblonga acute punctulato-striata, interstitiis planis, subtiliter punctulatis, erecte pubescentibus. Long. 6½—7½ millim.

Hab. La Noria, in Sinaloa (*Höge*).

A remarkable species, in its style of coloration unlike any other known of the genus. The elytra have no trace of foveæ.

Lachnophorus cuprellus.

L. subaurato (Bates) proxime affinis; differt thorace fere lævi, etc. Nigro-æneus, capite thoraceque lætius æneis elytris subcupreis sat nitidis; antennis nigro-fuscis articulis 1—4 (apicibus fuscis exceptis) femoribusque flavo-testaceis, tibiis et tarsis fusco-nigris. Caput punctulatum et strigulosum, collo lævi. Thorax parvus cordatus mox pone angulos anticos ampliatus deinde valde angustatus, parte basali cylindrica, supra vage subtiliter rugosus sed haud punctatus. Elytra anguste oblonga, exarato-striata, striis versus basin crenato-punctatis, interstitio 3io trifoveato. Long. 5 millim.

Hab. La Noria in Sinaloa, and Ventanas in Durango (*Höge*). Three examples.

Closely allied to the Guatemalan *L. subauratus*, but certainly distinct; the elytra are more narrowly oblong and less convex, the thorax much more narrowly cordate and narrowed more gradually behind, the straight sides for a short distance before the base being the same; the surface is not coarsely confluent-punctate, as in

L. subauratus; the head is more closely punctured, the punctures in *L. subauratus* being few and large, and, on the other hand, the interstices are smooth, so that the surface is more brilliant. The antennæ in *L. subauratus* are much stouter, and, with the legs, are fulvous.

Casnonia sulcicollis. (Pl. XIV., fig. 8).

C. pictæ et *C. pennsylvanicæ* affinis. Multo minor et minus gracilis. Nigra, polita, elytris cærulescentibus immaculatis, antennis articulis 2—3 et 4to ad basin, rufis, pedibus flavo-testaceis, femoribus tibiisque ad apicem et tarsis fuscis. Caput et oculi sicut in *C. pennsylvanica* illud sat paullo minus elongatum. Thorax paullo brevior, convexus, ad medium gracile ovatus prope apicem leviter constrictus angulis anticis productis acutis; sutura pronoti utrinque a supra perspicua sulciformi, prosterno grosse punctato. Elytra a basi usque ad paullo ultra medium grosse striato-punctata, triente apicali lævissima. Long. 6½ millim.

Hab. Ciudad, in Durango (*Höge*).

Mr. Flohr has also sent us examples of this distinct species from the same locality.

Casnonia lioptera.

C. tetrastigmæ (Chaud.) et *C. lineolatæ* (Bates) affinissima; differt elytris callo præapicali carentibus, etc. Gracilis, nigro-polita, antennis articulis 2—4 rufis, 8—9 testaceo-albis, femoribus dimidio basali (cum trochanteribus posticis) tibiisque annulo mediano, albis; elytris utrinque macula unica (laterali prope apicem) testaceo-alba. Caput lævissimum antice convexum, post oculos prominentes elongatum rectilineatim angustatum, collo brevissimo. Thorax elongatus, angustus, usque longe post medium gradatim leviter dilatatus, perparum subtiliter transverse striatus, sutura prosternali tenuissima. Elytra angusta oblonga, angulis exterioribus apice sat productis; lineis punctorum abbreviatis prope basin exceptis fere lævia, sed striis punctulatis, dorsalibus tenuissimis sub lente (juxta maculam præapicalem profundioribus) perspicuis; fovea utrinque magna prope basin; callo apud maculam præapicalem nullo. Long. 9½ millim.

Hab. Atoyac, in Vera Cruz (*Flohr in coll. Bates*).

Höge's collections do not contain this species, which might be considered a variety of *C. tetrastigma* (Chaud.) were it not for the absence of præapical callus, which is

so conspicuous a feature in that and other allied species; the interstice covered by the whitish spot near the apex is nearly quite plane in *C. lioptera*. The short rows of punctures near the base are much smaller than in *C. tetrastigma*, though the punctured striæ on the rest of the surface are much more clearly indicated. The external apical angles are more produced, but do not form long tooth-like projections, as in *C. rufipes*.

Galerita ovalipennis. (Pl. XIV., fig. 9).

G. Boucardi, Chaud., quoad formam simillima, differt antennis palpis et pedibus rufis. Nigra-obscura opaca breviter erecte fulvo-pubescens, genis post oculos sat late et breviter rotundatis. Thorax sat elongatus quadratus, ante medium mediocriter rotundato-dilatatus deinde longo sinuatus et parum angustatus, angulis posticis oblique productis et subelevatis. Elytra relative brevia, convexa valde costata, lineis geminatis in sulcis vix elevatis lineam punctorum includentibus, humeris omnino rotundatis. Long. 17 millim.

Hab. Soledad and Xantipa, in Guerrero (*H. H. Smith*). Two examples.

Galerita Lecontei, Dejean, Sp. Gén., v., p. 294.

Hab. Villa Lerdo, in Durango (*Höge*).

This species has been added to the Mexican fauna by Herr Höge, from whom we have two or three examples resembling Texan specimens of *G. Lecontei*.

Zuphium punctipenne.

Z. mexicano (Chaud.) simile, minor, et differt elytris una cum thorace conspicue sat dense punctatis. Parvum depressum, supra toto erecte pubescens, fulvo-testaceum subnitidum capite apiceque elytrorum interdum infuscatis. Caput sparse punctatum politum; thorax quam in *Z. mexicano* brevior, antice subrectus angulisque distinctis etsi obtusis nec ut in *Z. punctipenni* rotundatis, lateribus post medium valde sinuatis angulis posticis exstantibus acutis, basi medio lobato, supra subdense conspicue punctatus. Long. 5 millim.

Hab. Cuernavaca (*Höge*). Five examples, among a small series of *Z. mexicanum* from the same locality. The thorax is more strongly punctured than in *Z. mexi-*

canum, and the elytra, instead of being finely alutaceous, are punctured throughout, without tendency to confluence, nearly as strongly as the thorax. The short basal lobe of the thorax is quadrate, its sides forming a nearly right angle with the portion of the base near the angle.

Diaphorus rufulus, Leconte, Ann. Lyc. N. York, v., 173 (*Enaphorus*, id.).

Hab. Teapa, in Tabasco (*H. H. Smith*).

A single example which, though it agrees with Leconte's description as far as it goes, I refer with doubt to this species. The locality of his specimens was St. Jose, California.

Inna planipennis. (Pl. XIV., fig. 10).

I. Boyeri (Chaud.) affinis, sed major elytris deplanatis, etc. Rufo-picea subnitida supra obscurior elytrisque subviridi-metallicis, margine explanato rufo-translucenti; antennis et palpis rufo-testaceis. Caput elongatum, exsertum, media fronte cum vertice fere lævibus sparse subtiliter punctulatis, collo transversim grosse et densius punctato. Thorax medio angulatim dilatatus antice paullo curvatim postice sinuatim angustatus, antice arcuatim emarginatus, postice fere truncatus, lateribus explanato-reflexis, rufo-translucentibus, margine irregulariter serrato quasi eroso angulis posticis rectis; supra grosse subconfluenter punctatus. Elytra oblongo-quadrata, depressa, costis utrinque septem mediocriter elevatis (suturali inclusa) hic illic planatis punctulatis, interstitiis versus basin biseriatim, apicem versus et lateribus confuse, pluri-punctatis. Long. 8½—11 millim., ♂ ♀.

Hab. Temax, North Yucatan (*Gaumer*); Jalapa (*H. Edwards*).

Var. Thorax angustior lateribus haud angulatis margineque reflexo angustiori; capite supra adhuc læviori.

Hab. Teapa, in Tabasco.

M. Sallé has favoured me with an example of this species, which he has also received from Yucatan. The punctuation of the interstices of the elytra varies in the different examples; in some the small punctures in the middle of the interstices begin near the base.

I. costulata (Chaud.) has also been received from Mr. Gaumer from Temax, the specimens differing in no essential respect from those taken at Bugaba, in the

State of Panama, by Mr. Champion. It is a smaller and narrower insect, with the head strongly punctured throughout, and the sides of the thorax rounded with but slight angularity.

Brachinus amplipennis.

B. mexicano (Dej.) quoad formam similis, sed major elytrisque relative latioribus. Fulvo-aurantiacus, elytris viridescenti-cæruleis, antennis articulis 3io vel 4to leviter infuscatis; subtus episternis posticis ventrisque lateribus nigrescentibus. Caput post oculos gradatim fere recte angustatum, collo haud constricto, setifero-punctatum vertice parum convexo lævi. Thorax anguste cordatus quam in *B. mexicano* planior, margine laterali (a latere viso) multo minus arcuato; versus basin plus minusve profunde sinuatus angulis posticis exstantibus, supra dense erecte pilosus nec rugulosus. Elytra mediocriter convexa, obtuse carinata (carinis lævibus, versus latera et apicem obsoletis) interstitiis pilifero-pluripunctulatis. Antennæ longitudine mediocres. Long. 11—14 millim.

Hab. Villa Lerdo, in Durango; Paso del Norte in Chihuahua, Tampico in Tamaulipas (*Hoge*).

In real affinity, and especially in the sculpture and pubescence of the thorax, this species belongs to the North American group, of which *B. fumans* is the type. Though similar in form to the larger examples of *B. mexicanus*, it differs widely from that species, and from all the Mexican species hitherto described, except *B. hirsutus* (Bates), in the densely hairy thorax, which, in the other species, shows only a few hairs towards the anterior angles. *B. mexicanus* differs besides in the blackish antennal joints 3 to 4, in the black abdomen, reddish only in the middle of the base, and in the more convex elytra and more strongly raised carinæ and glabrous interstices. *B. hirsutus* is smaller than *B. amplipennis*, with shorter and broader thorax and more acutely carinated elytra.

Brachinus Tabasconus.

B. amplipenni affinis et similis; differt solum elytris disco et basi fere glabris interstitiis uniseriato- vel pauciter-punctulatis. Long. 12—14 millim.

Hab. Juan Bautista in Tabasco; Tlacotalpam in Vera Cruz (*Höge*).

The description above given of the northern *B. amplipennis* will apply to this form from the opposite extremity of Mexico, with the exception that the elytra, instead of having a large number of piliferous punctures in the interstices, have only an irregular row of mostly glabrous punctures, at least in the interstices 1—6 from the base to about the middle. The punctures are destitute of hairs towards the base, and hence the elytra are more glabrous and shining; their colour also is generally greener than in *B. amplipennis*. The thorax is somewhat elongate, and varies in outline, as in the other species, and its surface is densely clothed with piligerous punctures.

In one or two examples of the series before me the interstitial punctures are not uniseriate, but irregularly two or three abreast; these form transitions to *B. Tabasconus*, and the form can scarcely be considered as more than a local variety of that species. Transition varieties are, however, very frequent in the genus *Brachinus*.

Brachinus cognatus, Chaud., Monogr. d. Brachyn., p. 64.

The typical form of *B. cognatus* in Southern and East-central Mexico has short convex elytra, with strong glossy carinæ and smooth interstices; the whole under surface being pale red, like the head and thorax. A character omitted by Chaudoir is the absence of hairs from the surface of the thorax and elytra; viewed laterally, no trace of pilosity is visible. The following variety is from Northern Mexico; it agrees with the type in every respect, except as stated in the following diagnosis :—

Var. *cancellatus*. Elytra longius ovata, convexa, carinis elevatis, angustioribus interstitiisque transversim impressis; antennis articulo 4to 3ioque basi fuscis. Long. 7—8 millim.

Hab. Aguas Calientes City; Villa Lerdo, in Durango; Chihuahua City (*Höge*).

In two examples only, respectively from Lerdo and Chihuahua, are the transverse impressions of the elytral interstices strongly marked; but they agree with the others, in their subelongate form and other characters, from Aguas Calientes.

Coptodera xanthopleura.

C. auratæ (Chevr.) affinis et similis, sed differt colore viridi-æneo minus nitido, præcipue elytris obscurioribus margine explanato laterali epipleurisque fulvis, interstitiis convexis. Caput et thorax sicut in *C. aurata*, viridi-ænea polita, hic valde transversus, postice angustatus sed lateribus haud sinuatis; antennis pedibusque rufis illis articulis 5—11 obscurioribus. Elytra paullo brevius oblonga, obscurius viridi-ænea, subpunctulatim striata interstitiis convexis, margine laterali explanato epipleurisque fulvo-testaceis. Pedes piceo-fulvi femoribus cum corpore subtus nigris. Long. 8½ millim.

Hab. Tehuantepec (*Sallé*); Dos Arroyos, in Guerrero (*H. H. Smith*).

An example of this species was overlooked by me in the series of *C. aurata* in the Sallé collection. Mr. Smith has since obtained one exactly similar in the State of Guerrero.

Cymindis pilosa, Say, Trans. Am. Phil. Soc., ii., p. 10 (1823); *C. pubescens*, Dej., Sp. Gén., i., 215.

Hab. Cholula, in Puebla (*Höge*).

One example, which I cannot distinguish from specimens of *C. pilosa* from the Eastern States of N. America. The species is an addition to the Mexican fauna.

Pinacodera atrata, Chevr., Biol. Centr.-Am., Col., i., 1, p. 187.

All the numerous examples taken by Mr. H. H. Smith at Omilteme and Xucumanatlan, in Guerrero (alt. 7—8000 ft.), have rather clear reddish antennæ and palpi, and very many have all the trochanters and tarsi of the same colour. The outline of the thorax and strength of the punctuation of the upper surface vary, but the latter is generally greater than in the typical *P. atrata* from Mexico City. A more universal point of difference is the reddish antennæ. The variety may be distinguished as follows:—

Var. *ruficornis*. Antennis, palpis et interdum trochanteribus tarsisque rufis. Long. 9—14 millim.

Another variety of this variable species is distinguished by the almost impunctate upper surface:—

Var. *lævior*. Supra subtilissime et sparsim punctulata vel toto lævis, elytris politis, striis subtilibus et subtiliter punctulatis; antennis et palpis rufescentibus.

Hab. Huitzo, in Oaxaca (*Höge*). Many examples.

Apenes hilariola. (Pl. XIV., fig. 11).

A. pallidipe affinis; minor et gracilior, elytris nitidulis fusco-æneis, etc. Caput et thorax rufa, illo utrinque post oculum, hoc vitta indistincta utrinque discoidali, fuscis, capite supra sat dense subtiliter flexuoso-ruguloso et punctulato. Antennæ nigro-fuscæ articulis 1—2, 3tioque basi rufis. Thorax capite latior, quam in *A. pallidipe* longior, lateribus minus arcuatis; totus transversim strigulosus et subtiliter punctulatus. Elytra subtilissime alutacea sed sat nitida punctulato-striata, fusco-ænea, humeris et margine laterali late, vitta brevi supra interstitium 6um apice intus supra interstitia 4 et 5um prolongata, fasciaque late undulata præapicali, flavo-testaceis. Pedes flavi geniculis infuscatis. Subtus rufo-polita lateribus ventrisque dimidio apicali fusco-nigris. Long. 9 millim.

Hab. Cuernavaca, Colima City (*Höge; Flohr in coll. Bates*).

Two examples only. The base of the elytra is dark bronze from the suture to the 6th stria, with the exception of the outer half of the interstice divided by the scutellar striole, which is reddish. The præapical fascia is composed of rather long spots on interstices 3—7, the 8th—10th interstices being occupied by the marginal vitta.

Apenes amplicollis. (Pl. XIV., fig. 12).

Major et latior, nigro-fusca, pedibus flavo-testaceis, antennis palpisque obscure rufo-testaceis scapo pallidiori. Caput sicut in *A. pallidipe* ovatum, oculis parum prominentibus, supra totum dense punctato-strigulosum. Thorax latus paullo transversus dense punctulatus et transversim strigulatus, subnitidus, lateribus præcipue antice rufo-translucentibus. Elytra latius oblonga acute exarato-punctulato-striata, interstitiis planis, disperse punctulatis et alutaceis sericeo-opacis, margine laterali explanato grossius punctato; utrinque maculis duabus aurantiacis 1ma majori humerali apud interstitia 6—8, 2da præapicali minor apud interstitia 5—8, maculis interdum subobsoletis. Subtus fusco-nigra, nitida. Long. 11—12 millim.

Hab. Ventanas, in Durango (*Höge*); Tepic (*Flohr in coll. Bates*).

Larger and broader than any other described species of the *A. pallidipes* group, resembling more *A. omostigma* and *A. purpuripennis* of Chaudoir's group "Apenes ingenuæ," from which it differs in the narrower and more oval head.

Xenodromius, nov. gen.

Gen. *Axinopalpo* (Lec.) affinis, a quo differt unguibus simplicibus elytrisque versus basin angustatis humerisque rotundatis. Caput exsertum post oculos subrecte prolongatum paullo angustatum, oculis parum prominentibus. Palpi articulo apicali in maxillaribus gracile fusiformi subacuminato, in labialibus ovato obtuse truncato. Antennæ elongatæ dimidium elytrorum attingentes versus apicem gradatim crassiores, articulis 1—2 et 3ii dimidio glabris. Thorax cordatus ad apicem capite multo latior, angulis anticis paullo porrectis, mox pone apicem rotundato-dilalatus deinde sinuatim valde angustatus angulis posticis distinctis sed obtusis, margine basali versus angulum valde obliquato. Elytra plana, subovata, versus basin angustata apice latissime rotundata subtruncata, angulis humeralibus omnino rotundatis, plica basali brevi profunde sinuata; poris marginalibus magnis a supra conspicuis, epipleuris longe ante apicem terminatis. Setæ supraorbitales duo. Metathoracis episterna brevia subquadrata. Tarsi sat robusti, articulo 4to unguibusque simplicibus.

Axinopalpus humeralis, Solier (*Variopalpis*, id.), has a similar exserted head, but differs in its oblong-quadrate elytra, like all other species of the same genus. With regard to the form of the thorax, *Axinopalpus brevicollis*, Germ., and *A. brunneus*, Chaud., approach closely our new genus. In the form of the head and elytra, *Xenodromius* recalls forcibly the *Brachinus* type.

Xenodromius Flohri. (Pl. XIV., fig. 13).

Deplanata, glabra, rufo-testacea polita, elytris (epipleuris rufis exceptis) castaneo-fuscis, striatis, striis perparum impressis vage punctatis. Long. 4—4½ millim.

Hab. Las Vigas (*Flohr in coll. Bates*). Two examples, apparently female, the anterior tarsi not being dilated.

Calleida chlorotænia. (Pl. XIV., fig. 14).

C. circumcinctæ (Bates) affinissima, sed differt thorace ante medium late rotundato geniculis nigris, etc. Minus elongata, subdepressa, fulva nitida, antennis articulis 3—11, palpis (apice pallido excepto) genubus tarsisque nigris; elytris vitta angusta marginali splendide viridi, ab humero fere usque ad apicis angulum exteriorem extensa et interstitia 8—9 tegenti (postice interdum angustiori). Thorax latus, ante medium late rotundatus postice perparum vix sinuatim angustatus, angulis posticis subrectis, lateribus late explanato-reflexis et punctatis plicaque crassa curvata cum margine laterali parallela transversim strigosa. Elytra acute punctato-striata, interstitiis planis sparsim punctulatis, 3io poris duabus 1mo prope basin 2do prope apicem. Long. 9 millim.

Hab. Acapulco (*Höge*).

In *C. circumcincta* the thorax has a similar curved fold, or wheal, near to the explanated lateral margin, but the thorax is narrower, the sides scarcely curved from the middle to the fore angle, and strongly sinuated behind; the outline, however, varies considerably in *C. chlorotænia*. The legs also are concolorous, rufous.

Loxopeza calomicra.

Parva, angustula, rufa polita, elytris, epipleuris (cum margine tenui) plicaque basali rufis exceptis, læte viridi-æneis. Caput læve. Palpi articulo penultimo ultimoque basi nigris; antennæ articulis 5to—11mo, 4toque apice nigro-fuscis. Thorax transversus versus apicem sat late rotundatus, lateribus late explanatis disco vix ruguloso. Elytra sat anguste oblonga, acute striata interstitiis versus basin convexis postice planioribus. Venter nigro-piceus. Long. 5½ millim.

Hab. Acapulco (*Höge*).

Two examples only, both females. The emarginate and not bilobate penultimate tarsal joints, added to the coloration, are almost sufficient to show that this species belongs to the genus *Loxopeza*, but it is only on the examination of the anterior tarsi of the male that its true position can be decided. It is smaller and slenderer than *L. atriceps;* the elytra are brassy green.

Lebia Smithiella.

L. quadricolori (Chaud.) affinis, sed elytris distincte etsi haud acute striatis. Oblonga, capite et elytris læte viridi-cyaneis metallicis,

thorace toto, pedibus, antennarum articulis 1—3 et 4ti basi (cæteris fuscis) rufis, meso- et metasternis, palpis, abdomineque nigro-viridibus. Caput breve, convexum, læve, oculis magnis prominentibus. Thorax capite parum latior, quadratus paullulum transversus, ante medium paullo rotundatus postice perparum sinuato-angustatus, margine laterali mediocriter (postice latius) explanato-reflexo. Elytra subtiliter alutacea sericeo-opaca, apice flexuoso-truncata, subtiliter haud acute striata. Long. 6 millim., ♂ ♀.

Hab. Chilpancingo, 4600 ft., Amula, 6000 ft. (*H. H. Smith*).

Allied to *L. quadricolor* (Chaud.), from which it is conspicuously distinct in the explanated lateral margins of the thorax. This and its coloration gives it a great resemblance to the smaller *Loxopezæ*, especially *L. atriceps* (Lec.); the transversely truncated apices of the dilated anterior tarsi in the males show, however, that it does not belong to that genus, but to *Lebia*.

Lebia furcata, Leconte, Ann. Lyc. N. York, iv., 193.

Hab. Teapa, in Tabasco (*H. H. Smith*).

One example of this N. American species, agreeing with numerous specimens from Utah and Montana, with which I have compared it, was obtained by Mr. Smith. *L. furcata* is an addition to the Mexican fauna.

Agra pacifica.

A. ictinæ (Bates) proxime affinis, forsan ejus varietas geographica. Gracilis, fusco-nigra ænescens, elytris obscure cupreis. Caput post oculos mediocriter prolongatum, rotundato-angustatum occipite medio fovea vaga elongata lateribus utrinque 2—3 punctatis. Thorax mediocriter elongatus lateribus rotundatis, prope apicem tantum angustatus ad basin paullo constrictus, crebrius grosse punctatus, linea dorsali lævi interdum interrupta, linea utrinque discoidali irregulari. Elytra angusta postice perparum ampliata acute punctulato-striata, interstitiis planis 2ndo 4to et 6to poris setiferis parvis 6—8, apice flexuoso-truncata; epipleuris rufescentibus æneo-tinctis, margine superiori interdum viridi-æneo. Prosternum toto grosse punctatum.

♂. Metasternum ventrisque segmenta 1—4 medio, tenuiter punctulato-pilosa; femoribus trochanteribusque glabris. Segmentum apicale ventrale medio incisum. Tibiæ 4 posticæ intus versus apicem pilosæ.

♀. Sterna et venter glabra. Segmentum apicale leviter angulatim emarginatum. Antennæ articulo 8vo nullo modo abbreviato. Long. 15—16 millim.

Hab. Acapulco (*Höge*). Seven examples.

Closely resembling *A. ictina*; differing, in both sexes, chiefly in the flatter elytral interstices, with finer and more sharply incised striæ and rather smaller but very conspicuous setigerous pores, and, in the ♂, by the less dense and more limited pubescence of the under surface, which in *A. ictina* extends to the coxæ and trochanters. The description of *A. ictina* applies to the Guatemala specimens, those from Cordova (I have only a ♀ example before me) being in some respects intermediate between *ictina* and *pacifica*. One or two setigerous pores are found on the 6th interstice in *A. ictina*, but they are usually more numerous in *A. pacifica*.

Agra cyanippe.

A. elainæ (Bates) similis. Angusta supra et subtus viridi-cyanea, capite antennis tibiis et tarsis nigrioribus. Caput angustum lævissimum, post oculos valde elongatum et vix angustatum angulis posticis rotundatis. Thorax fere linearis prope apicem sat subito angustatus, lineatim grosse punctatus, linea irregulari angusta dorsali lineisque discoidalibus utrinque latioribus, lævibus, prosterno lateribus grosse punctatis. Elytra mediocriter angusta pone medium læviter ampliata, apice recte truncata, angulo exteriori subacuto sed non producto, suturali recto subobtuso; profunde punctato-striata (striola scutellari dilatata) poris setigeris in striis 2nda et 4ta sitis haud conspicuis. Antennæ articulo 8vo abbreviato, ♀. Long. 14 millim.

Hab. Yautepec, in Morelos (*Flohr in coll. Bates*).

One example only.

For a list of the new and additional species and new varieties of *Cicindelidæ* and *Carabidæ* added to the Mexican fauna in this and the preceding paper (Trans. Ent. Soc. Lond., 1890, pp. 493—510), see pp. 276 and 277; and for an Explanation of Plates XIII. and XIV., see p. 278.

The following is a list of the new and additional species and new varieties of *Cicindelidæ* and *Carabidæ* added to the Mexican fauna in this and the preceding paper (Trans. Ent. Soc. Lond., 1890, pp. 493—510) :—

Cicindela obsoleta, Say, var. *santaclaræ*, Bates (Trans. Ent. Soc. Lond., 1890, p. 493).
C. thalestris, Bates, p. 494. ,,
C. scotina, Bates, p. 494. ,,
C. viatica, Chevr., var. *nigrilabris*, Bates, p. 495. ,,
C. melania, Bates, p. 495. ,,
C. ritteri, Bates, p. 496. ,,
C. plurigemmata, Bates, p. 496. ,,
C. rugatilis, Bates, p. 497. ,,
C. præcisa, Bates, p. 498. ,,
C. guerrerensis, Bates, p. 499. ,,
C. speculans, Bates, p. 500. ,,
C. punctulata, Fabr., var. *chihuahuæ*, Bates, p. 500. ,,
C. politula, Lec., p. 501. ,,
C. dugesi, var. *calomicra*, Bates, p. 501. ,,
C. deliciola, Bates, p. 502. ,,
C. rufiventris, Dej., var. *ventanasa*, Bates, p. 503. ,,
C. nebuligera, Bates, p. 504. ,,
C. flavo-punctata, Chevr., var. *chiapana*, Bates, p. 505, ,,
C. sinaloæ, Bates, p. 505. ,,
C. euryscopa, Bates, p. 506. ,,
C. sperata, Lec., p. 507. ,,
C. psilogramma, Bates, p. 507. ,,
C. leuconoë, Bates, p. 508. ,,
C. debilis, Bates, p. 509. ,,
Calosoma ampliator, Bates, *antea*, in this Paper, p. 223.
C. lugubre, Lec., p. 224.
C. macrum, Lec., p. 224.
C. læve, Dej., var. *punctulicolle*, Bates, p. 225.
C. læve, Dej., var. *explanaticolle*, Bates, p. 225.
C. læve, Dej., var. *microgonum*, Bates, p. 225.
C. omiltemium, Bates, p. 226.
C. diminutum, Bates, p. 227.
C. morelianum, Bates, p. 228.
C. porosifrons, Bates, p. 229.
Scaphinotus macrogonus, Bates, p. 229.
Pasimachus duplicatus, Lec., p. 230.
P. ignicinctus, Bates, p. 230.
P. lævisulcatus, Bates, p. 231.
P. quirozi, Flohr, p. 231.
P. mexicanus, Gray, var. *cæruleus*, Bates, p. 231.
P. Smithi, Bates, p. 232.
Scarites durangoensis, Bates, p. 232.
Distichus granulipygus, Bates, p. 232.
Schizogenius multisetosus, Bates, p. 233.
Scythropasus nicaraguensis, Bates, p. 234.*
Micrixys distinctus, Lec., p. 234.
Chlænius chrysopleurus, Chaud., var. *guerreroensis*, Bates, p. 235.
C. cordifer, Bates, p. 235.
C. porphyrius, Bates, p. 236.
C. eurybates, Bates, p. 236.
C. beatus, Bates, p. 237.
C. amplians, Bates, p. 237.
C. suppletor, Bates, p. 237.
Dercylus mexicanus, Bates, p. 238.
Dicælus costatus, Lec., var. *lerdoensis*, Bates, p. 238.
D. lævipennis, Lec. (*Flohri*, Bates), var. *abbreviatus*, Bates, p. 239.
Anisotarsus hilariolus, Bates, p. 239.
Harpalus durangoensis, Bates, p. 240.
H. gravis, Lec., p. 240.
Pangus caliginosus, Fabr., p. 241.
Cratacanthus dubius, Beauv., p. 241.
Selenophorus aurocupreus, Bates, p. 241.
S. tarsalis, Putz., var. *liosomus*, Bates, p. 242.
S. bradycelloides, Bates, p. 242.
S. dispar, Bates, p. 243.
S. crassiusculus, Putz., var. *nigrescens*, Bates, p. 243.
Discoderus dislocatus, Bates, p. 245.
Agonoderus pallipes, Fabr., p. 246.
Bradycellus Flohri, var. *denigratus*, Bates, p. 247.
Stenolophus plebejus, Dej., p. 246.
S. lamprotus, Bates, p. 246.
Celia californica, Dej., p. 247.

* This species, though not belonging to the Mexican fauna, is included here for convenience.

Celia hœgei, var. *civitatis*, Bates, p. 247.
C. tenebrionella, var. *æneicolor*, Bates, p. 248.
C. ciudadensis, Bates, p. 248.
C. rectangula, Lec., p. 249.
Evarthrus substriatus, Lec., p. 249.
Pœcilus chalcites, Say, p. 249.
Euchroa chrysophana, Bates, p. 249.
Loxandrus rubricatus, Bates, p. 250.
Morio cyclonus, Chaud., p. 251.
Calathus gregarius, Say, p. 251.
C. ambigens, Bates, p. 251.
Pristodactyla impunctata, Say, p. 252.
Anchomenus megillus, Bates, p. 252.
Elliptoleus olisthopoides, Bates, p. 252.
Colpodes haptoderoides, Bates, p. 252.
C. harpaloides, Bates, p. 253.
C. steropoides, Bates, p. 254.
C. platysmoides, Bates, p. 254.
C. omaseoides, Bates, p. 255.
C. valens, Bates, p. 255.
C. stenos, Bates, p. 256.
C. tinctipennis, Bates, p. 257.
C. rectilineus, Bates, p. 257.
C. segregatus, Bates, p. 258.
C. trujilloi, Bates, p. 269.
C. æneicauda, Bates, p. 259.
C. acutulus, Bates, p. 259.
Pogonus emaciatus, Bates, p. 260.
Tachys decastichus, Bates, p. 261.
Pericompsus tabasconus, Bates, p. 261.
Bembidium sphærulifer, Bates, p. 261.
Bembidium macrogonum, Bates, p. 262.
B. erosum, Motsch., p. 262.
B. ciudadense, Bates, p. 263.
B. lævigatum, Say, p. 263.
B. Durangoensis, Bates, p. 263.
Anchonoderus fulvipennis, Bates, p. 264.
Lachnophorus cuprellus, Bates, p. 264.
Casnonia sulcicollis, Bates, p. 265.
C. lioptera, Bates, p. 265.
Galerita ovalipennis, Bates, p. 266.
G. lecontei, Dej., p. 266.
Zuphium punctipenne, Bates, p. 267.
Diaphorus rufulus, Lec., p. 267.
Inna planipennis, Bates, p. 267.
Brachinus amplipennis, Bates, p. 268.
B. tabasconus, Bates, p. 268.
B. cognatus, Chaud., var. *cancellatus*, Bates, p. 269.
Coptodera xanthopleura, Bates, p. 270.
Cymindis pilosa, Say, p. 270.
Pinacodera atrata, Chevr., var. *ruficornis*, Bates, p. 270.
P. atrata, var. *lævior*, Bates, p. 271.
Apenes hilariola, Bates, p. 271.
A. amplicollis, Bates, p. 271.
Xenodromius Flohri, Bates, p. 272.
Calleida chlorotœnia, Bates, p. 273.
Loxopeza calomicra, Bates, p. 273.
Lebia smithiella, Bates, p. 273.
L. furcata, Lec., p. 274.
Agra pacifica, Bates, p. 274.
A. cyanippe, Bates, p. 275.

Explanation of Plates XIII. & XIV.

PLATE XIII.

Fig. 1. *Calosoma omiltemium.*
2. ,, *diminutum.*
3. ,, *porosifrons.*
4. *Scarites durangoensis.*
5. *Scaphinotus macrogonus.*
6. *Pasimachus Smithi.*
7. *Chlænius porphyrius.*
8. ,, *eurybates.*
9. ,, *beatus.*
10. *Euchroa chrysophana.*
11. *Colpodes haptoderoides.*
12. ,, *harpaloides.*

PLATE XIV.

Fig. 1. *Colpodes steropoides.*
2. ,, *platysmoides.*
3. ,, *omaseoides.*
4. ,, *valens.*
5. ,, *rectilineus.*
6. ,, *segregatus.*
7. ,, *acutulus.*
8. *Casnonia sulcicollis.*
9. *Galerita ovalipennis.*
10. *Inna planipennis.*
11. *Apenes hilariola.*
12. ,, *amplicollis.*
13. *Xenodromius Flohri.*
14. *Calleida chlorotænia.*

X. *On the genus* Xanthospilopteryx, *Wallengren*.

By William F. Kirby, F.L.S., F.E.S., Assistant in the Zoological Department, British Museum (Natural History), South Kensington.

[Read February 4th, 1891.]

Plate XV.

Xanthospilopteryx, *Wallengren*.

" (*Noctua*, Fabr., *Agarista*, Auct., ex parte).

" *Antennæ* graciles, in medio sensim crassiores, apice attenuatæ, arcuatæ. *Palpi* capite longiores, subadscendentes, articulo ultimo haud nutante, articulus medius et basalis conformes, squamosi, pilis rigidis infra instructi, ultimus tamen gracilis, per totam suam longitudinem conformis, apice rotundatus, pilis rigidis obsitus, articulo intermedio longitudine æqualis. *Oculi* nudi. Frons squamosa, obtusa, haud prominens. *Pedes* fere ut in *Agarista*, sed tibiæ squamosæ, pilis brevissimis rarioribus instructæ. *Alæ* anticæ elongatæ, apice rotundatæ; omnes infra læves. Segmenta 4 abdominis fasciculis brevissimis lateraliter instructa. Abdomen maris ante anum valde coarctatum; anus in utroque sexu barbatus. *Costæ* al. posticarum 9, ut in genere memorato; costæ 1—3 e trunco superiore, 4ta e costula transversa cellulæ, 5—7 ex angulo postico cellulæ, sed 7ma haud procul ab octavam egredientes. Costæ al. anticarum 11, costa 1ma e basi, 2—5 e trunco inferiore, 6—9 e trunco superiore, 10—11 iterum e basi, hæc tamen in ipso margine antico; costa 3tia ex angulo postico cellulæ, 4ta—5ta haud procul abhinc et costula transversa, sed intervalla inter costas 3—5 invicem æqualia; costa 6ta ex angulo antico cellulæ; costæ 7—8 ex angulo areolæ accessoriæ hæc triramosa et ramulos 2 in marginem anticum ramulumque unicum in marginem exteriorem emittens; costa 9na e latere antico cellulæ. Cellula in alis posticis dimidiam partem alæ non superat, sed in anticis partem bitrientalem fere attingit. Areola accessoria triangulata, lateribus inæqualibus, cellulam tertia parte superans. Fam. *Castnii*. Species typica, *X. Geryon*, Fabr., ex Africa interiore."

The genus *Xanthospilopteryx* was founded by Wallengren in 1858, in the 'Œfversigt' of the Swedish Academy (p. 83). The typical species was *Noctua Geryon*, of Fabricius, but several species were at that time included under the names of *Geryon*, Fab., or *Euphemia*, Stoll; and as the actual species on which Wallengren founded his genus proved to be *Eusemia superba*, Butl., the latter becomes the true type.

Hitherto the species of *Xanthospilopteryx* have usually been included in the East Indian genus *Eusemia*, Dalm.* (*Episteme*, Hübn.), but the section represented by *Eusemia Euphemia*, auct., is exclusively confined to Tropical and Subtropical Africa, from Abyssinia to Caffraria and Natal. The presence of an accessory cell in the fore wings, and the shorter and thicker legs, the shorter claws, unexpanded tarsal joints, &c., amply justify the separation of *Xanthospilopteryx* from *Episteme*.

There are other species from Africa, and more especially Madagascar, described under *Eusemia*, which do not belong to *Xanthospilopteryx*, most of which belong to Prof. Westwood's genus *Rothia*; these I do not intend to discuss at present. No true *Xanthospilopteryx* appears to inhabit Madagascar.

The British Museum is very rich in species of this genus, which my friend and colleague Mr. Butler has just rearranged. The total number of species on our lists (including one or two doubtfully belonging to *Xanthospilopteryx*, and two new species described below) is 25, of which the Museum possesses no less than 18. Mr. Butler therefore agreed with me that it would be useful to give a short sketch of the species, most of which are described by English authors, and seem very little known abroad, as Mabille, in a paper on the subject in the 'Annales de la Soc. Ent. de France' (6), x., Bull., pp. cxxii—cxxiv, has just stated that he is only acquainted with 8 species of the group, 4 of which he describes as new; and that he has only been able to find descriptions of 5 species already described, one of which (*Eusemia contigua*, Walk.) is unknown to him.

The species of *Xanthospilopteryx* are handsome moths, measuring from $1\frac{1}{2}$ to $3\frac{1}{4}$ in. in expanse, according to the species. The fore wings† are usually longer than

* The type of *Episteme*, Hübn., or *Eusemia*, Dalm., is the Chinese *Noctua Lecteix*, Linn.

† I object to the American application of the ornithological

the hind wings, the apex rounded (rarely subacute), and the hind margin either regularly rounded or convex. The hind wings are regularly rounded, and more distinctly sinuated than the fore wings, and the fringes are entire or very slightly sinuated, and rather long for moths of comparatively large size.

Although the species are numerous and handsome, their colours and pattern are rather uniform. The fore wings are always black, with pale yellow, or more rarely, white spots, those nearest the hind margin often more or less connected, and sometimes coalescing (except the spot near the hinder angle) into one continuous band or blotch. The hind wings are usually of the bright crimson colour so common among African Lepidoptera (which is liable to fade to a yellowish shade), but more rarely distinctly yellow, or even white; and the fringes here also are sometimes narrowly edged with white, or other pale colour, towards the upper part of the hind margin. The abdomen generally extends a little beyond the hind wings, and is nearly always yellow, banded with black, and tufted at the extremity with yellow, or—in the males—usually with black.

The spotting of the fore wings is very uniform, and the ordinary spots may often be conveniently referred to by numbers. There is, firstly, a spot near the base of the cell, and sometimes continued below it (No. 1)); a second, larger and more square, towards the end of the cell (No. 2); an irregularly-shaped spot below No. 2, often filling up the space between the median and submedian nervures (No. 3); a long dash on the inner margin, below No. 1 (No. 4); the apical spot (No. 5), which is sometimes broken up into a row of more or less contiguous spots (No. 5), and a spot towards the hinder angle (No. 6). No. 4 is sometimes represented by an irregular mark above, instead of below, the submedian nervure. There are usually some obsolete pale blue or plumbeous markings formed of scattered scales, and the tibiæ are nearly always more or less yellow.

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terms, "primaries" and "secondaries," to the wings of Lepidoptera, because they are in universal employment in another branch of Zoology in a totally different sense. Such an application of well-known scientific terms seems to me to be both unnecessary and inconvenient, and well deserving of rejection on the ground of pre-occupation.—W. F. K.

After these preliminaries, I will enumerate the known species of this genus, adding a short diagnosis of each.

Genus Xanthospilopteryx, *Wallengr.*

Wallengren, Œfv. Vet. Akad. Förh., xv., 83 (1858).

Eusemia, p. auct.

A. *Species with white markings on the fore wings.*

1. *Xanthospilopteryx Hornimani*, Druce.

Eusemia Hornimani, Druce, Ent. Mo. Mag., xvi., p. 269 (1880); Waterh., Aid, ii., pl. clv., fig. 5 (1885).

Exp. $2\frac{3}{4}$—3 in.

Fore wings black, with creamy white markings. Spot 1 expanded below as far as the submedian nervure; spots 2 and 3 large, sometimes connected with No. 1 by lines above the subcostal and submedian nervures; spot 4 wanting, spot 5 subparallel, hardly divided by the nervures; spot 6 small. Hind wings creamy white, with black borders; fringes concolorous; body black, dotted with white; anal tuft yellow.

Hab. Mongo-ma-Lobah (type); Cameroons and Isubu. B. M.

The only known species with white hind wings.

2. *Xanthospilopteryx* (?) *tigrina*, Druce.

Hespagarista tigrina, Druce, Proc. Zool. Soc. Lond., 1882, p. 778, pl. lx., f. 4.

Metagarista (?) *tigrina*, Kirb., Cat. Lep. Het., i., p. 41, n. 2 (ined.).

Exp. $2\frac{3}{4}$ in.

Fore wings black, the 4 first spots replaced by 3 oblique stripes, the 2nd largest, the 2 basal ones inclining to buff; spot 5 divided below by the last nervure which intersects it; spot 6 small; a dull red suffused band before hind margin. Hind wings fulvous, with black borders, and white-spotted fringes; body black, sides of abdomen tawny on the basal half; apical half belted with white anal tuft black.

Hab. Cameroons and Old Calabar; Cameroons. B. M.

Mr. Butler considers this species to be allied to *Eusemia contigua*, Walk., but it appears to me to have more relationship to *Metagarista* or *Ægocera*. The peculiar dull red submarginal band on the front wings is found in no other species likely to be referred to *Xanthospilopteryx*.

3. *Xanthospilopteryx* (?) *Poggei*, Dew.

Eusemia Poggei, Dewitz, Mitth. Münch. Ent. Ver., iii., p. 31, pl. ii., f. 3 (1879).

Exp. 2¾ in.

Red, with broad black borders. Fore wings with a long black spot filled up with leaden, closing the cell; costa and inner margin narrowly bordered with black; hind margin with 4 or 5 white spots on the upper part, and one at the hinder angle, above which the border is deeply indented by the ground colour, and then runs up into it still more sharply. Hind wings with the fringes spotted with white (inner margin yellow in the figure); body black, spotted with white; abdomen with the basal two-thirds yellow in the middle above.

Hab. Guinea.

Recognisable at once from the red colour extending over the greater part of the wings, as in the similarly-coloured African genera *Phœgorista*, *Aletis*, &c. The colour of the body may indicate some affinity to *X.* (?) *tigrina*. (While actually passing these pages for press, I have seen a specimen of a new species from East Africa, allied to *X. Poggei*).

4. *Xanthospilopteryx pallida*, Walk.

Eusemia pallida, Walk., Cat. Lep. Het. B. M., i., p. 51, n. 9 (1854); Butl., Ill. Lep. Het. B. M., i., p. 10, pl. v., f. 3 (1877).

Exp. 2½—2¾ in.

Fore wings black, with markings of a somewhat yellowish white. Hind wings red, with black borders. Apices pure white. Spots 1, 2, 3, 4, 6 placed as usual; spot 5 broken into 4 small spots, placed 2 together near the costa, and 2 together opposite the middle of the hind margin; body black, abdomen ringed with yellow.

Hab. Old Calabar; Cameroons. B. M.

In the type the white and red markings have faded to buff, but the former are still distinctly white on the under surface.

5. *Xanthospilopteryx niveosparsa*, Westw.

Eusemia niveosparsa, Westw., Oates' Matabele-Land, p. 355 (1881).*

Exp. 3 in.

Perhaps a variety of the last; described as having 7 small white spots on the fore wings; it would appear that the submarginal spots consist of one near the costa and a double one between this and the hinder angle. In *E. pallida* the former is double, and there is an additional spot at the hinder angle.

Hab. Cameroons.

6. *Xanthospilopteryx æmulatrix*, Westw.

Eusemia æmulatrix, Westw., Oates' Matabele-Land, p. 355 (1881).

Exp. $2\frac{1}{2}$—$2\frac{1}{4}$ in.

Very similar to the last two species, but the pale spots of a rather yellower white, and spot 5 forming a band divided only by the nervures into 5 spots.

Hab. Congo. B. M.

7. *Xanthospilopteryx* (?) *terminatis*, Walk.

Eusemia terminatis, Walk., Cat. Lep. Het. B. M., vii., p. 1587, n. 16 (1854).

Anaphela terminatis, Kirb., Cat. Lep. Het., i., p. 25, n. 17 (ined.).

Exp. 2 in.

Fore wings rather long, with white spots arranged nearly as in *X. pallida*, and with some smaller bluish spots near the base. Hind wings yellow, with rather broad black borders; body black; head and thorax spotted with white; abdomen banded with yellow in front, and (narrowly) with white behind. Anal tuft yellow.

Hab. ——?. B. M.

I am doubtful whether this species really belongs to *Xanthospilopteryx*, but mention it because it is placed there in the Museum Collection.

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* All the species of *Eusemia* described in the work above quoted belong to *Xanthospilopteryx*, except, perhaps, *E. glossutrix*, which I have excluded from the present paper; it is purplish black, with a straw-coloured marking on the front wings, and white borders to the hind wings. It is said to inhabit S.E. Africa.

B. *Species with ochraceous or yellow markings on the fore wings.* (In one or two species included in Section a, the white colour sometimes inclines towards yellow.)

a. *Hind wings with a conspicuous red or orange spot on the border near anal angle.*

This little group of two or three species is at present unrepresented in the Museum Collection.

8. *Xanthospilopteryx perdix*, Druce.

Eusemia perdix, Druce, Proc. Zool. Soc. Lond., 1887, p. 668 (1888).

Exp. 2¾ in.

Fore wings black, with orange-yellow spots, nearly as in *X. superba*, Butl., but with the basal spots coalescing into a basal band, and the apical spot narrower. Hind wings bright carmine, with black borders, and a red spot near the anal angle.

Hab. East-Central Africa; Manbria; Delagoa Bay.

9. *Xanthospilopteryx Eoa*, Mab.

Eusemia Eoa, Mab., Bull. Soc. Ent. France, ser. 6, vol. x., p. cxxiii. (1890).

Wings black. Fore wings with 3 rows of orange-yellow spots; a long basal spot, 3 intermediate, and a large apical one. Hind wings red, with a black border, enclosing an orange spot, divided by a fold, near the anal angle.

Hab.——?.

Perhaps the same as *X. perdix*.

10. *Xanthospilopteryx mozambica*, Mab.

Eusemia mozambica, Mab., Bull. Soc. Ent. France, ser. 6, vol. x., p. cxxiii. (1890).

Resembles *X. Eoa*, but the basal band of the fore wings is longer and narrower, and the apical spot broader. Hind wings with the black border broader, extending in a point along the first branch of the submedian; and a black band descends from the costa to the front of the cell.

Hab. Mozambique.

aa. *Hind wings with the border unspotted.*

b. *Apical spot replaced by a series of separate spots.*

11. *Xanthospilopteryx longipennis*, Walk.

Eusemia longipennis, Walk., Cat. Lep. Het. B. M., i., p. 51, n. 9 (1854); Butl., Ill. Lep. Het. B. M., i., p. 10, pl. v., f. 5 (1877).

Exp. 3—3¼ in.

Fore wings long, narrow, and rather pointed, black, with dull yellow spots; spot 1 very small or wanting, and spot 5 replaced by a series of 5 long well-separated spots, of which the 4th is the longest. Hind wings salmon-colour, with broad black borders, into which the ground colour projects rather sharply; tips of all the wings with the fringe white; abdomen, except at the tip, clothed with dirty yellowish hairs.

Hab. Congo. B. M.

The shape, the obsolete basal spot, and the well-separated apical band of spots, easily distinguish this species from any other, except, perhaps, the following.

bb. *Apical spot not distinctly divided.*

12. *Xanthospilopteryx nigridorsa*, Mab.

Eusemia nigridorsa, Mab., Bull. Soc. Ent. France, ser. 6, vol. x., p. cxxiii. (1890).

Fore wings black, with 2 rows of yellow spots; one median, formed of 2 spots, and one apical, formed of 5 confluent spots, the lower one only somewhat isolated. Hind wings red, with a very wide black border; fringe white, stained with black in the middle; body black.

Hab.——?.

Seems to differ from *X. longipennis* in the black body, whiter fringes, less divided apical spot, and (possibly) in the absence of spots 1, 4, and 6.

C. *Spot 1 forming a transverse band at the base; no streak (spot 4) on the inner margin.*

13. *Xanthospilopteryx* (?) *contigua*, Walk.

Eusemia contigua, Walk., Cat. Lep. Het. B. M., i., p. 50, n. 7 (1854); Butl., Ill. Lep. Het. B. M., i., p. 10, t. 4, f. 8 (1877).

Exp. 1⅔ in.

Fore wings black, with an oblique yellow band near the base, a transverse spot before the end of the cell, a long subapical spot, the lowest part nearly separated by a nervure; and spot No. 6 very small; fringes white at tips of fore wings. Hind wings salmon-red, with black borders. Head and thorax black, spotted with white; abdomen greyish brown, with narrow white rings.

Hab.——?. B. M.

A small species, which cannot be mistaken for any other. In pattern it slightly resembles *X. tigrina*, Druce.

14. *Xanthospilopteryx africana*, Butl.

Eusemia africana, Butl., Ann. Nat. Hist. (4), xv., p. 142 (1875).

E. meretrix, Westw., Oates' Matabele-Land, p. 355 (1881).

Exp. 1¾—2¼ in.

Fore wings black with yellow spots, basal spot forming a short band from the subcostal to the submedian nervure; spots Nos. 2 and 3 of nearly equal size; apical spot long, deeply indented on the inside, near the lower end; spot 6 small. Hind wings crimson, with black borders; fringes white at the tips of all the wings. Body black; head, thorax, and extreme base of fore wings spotted with white or bluish white; abdomen belted with yellow.

Hab. Natal, Zulu. B. M.

15. *Xanthospilopteryx indecisa*. (Pl. XV., fig. 1).

Eusemia indecisa, Butl., Ann. Nat. Hist. (6), vii., p. 50 (1891).

Exp. 2¼—2⅓ in.

Very similar to *X. africana;* the spots on the fore wings are of a more ochreous yellow, and the apical spot is not indented on the inner side.

Hab. Kandera, Central Africa. B. M.

cc. *Spot 1 not continued much below the median nervure.*

d. *Apical spot with the lower end cut off by a nervure.*

16. *Xanthospilopteryx Geryon*, Fabr.

Noctua Geryon, Fabr., Spec. Ins., ii., p. 216, n. 37 (1781).

Noctua Euphemia, Stoll, Pap. Exot., iv., pl. 345, fig. A (1782).
Eusemia Euphemia, Butl., Ent. Mo. Mag., xii., p. 120 (1875).
E. xanthopyga, Mab., Bull. Soc. Ent. France (6), x., p. cxxiv. (1890).
E. nugatrix, Westw., Oates' Matabele-Land, p. 356 (1881).

Exp. 2—2¾ in.

Fore wings black, with the usual 6 ochreous spots rather large, the apical one moderately broad, and indented within on its lower extremity; there are also frequently several smaller ones at the base, chiefly on the costa. Hind wings red, with black borders; tips of all the wings with white fringes. Body black; head spotted with white; abdomen belted with yellow; thorax with a collar of 4 yellow tufts in front.

Hab. Ashanti, Guinea, White Nile. B. M.

The oldest known species, well-characterised by the yellow collar, which is indicated in Stoll's figure. The locality he gives is Amboina, which, of course, is an error. The specimens from Sierra Leone and the White Nile agree best with his figure; those from the Gambia and Ashanti are smaller, and agree better with the description of *X. nugatrix*, Westw., which hardly appears to be a distinct species.

17. *Xanthospilopteryx Fatima*, sp. n. (Pl. XV., fig. 2).

Eusemia Euphemia, Mab., Bull. Soc. Ent. France (2), x., p. cxxiv. (1890).

Exp. 2¾ in.

Male. Intermediate between *X. Geryon* and *X. superba*. Fore wings black, with ochraceous spots as in the former species, except towards the base. Spot 1 forms the first of a series of 4, the 3rd and 4th linear, running obliquely to the inner margin, the 4th nearly obsolete; the base of the costa is marked with 3 small bluish white spots, followed by a streak of the same colour; another small bluish spot stands at the base, below the subcostal nervure; and there are 2 small ochraceous spots between this and the oblique series. Hind wings red, with black border. Under side similar, but fewer small basal spots, and spots 2 and 3 united into one continuous band. Head and thorax black, spotted with white; no yellow collar; yellow tufts above base of abdomen;

abdomen banded with yellow; anal tuft black; legs black, striped with yellow, and spotted with white; femora white below.

Hab. Taita, E. Africa. B. M.

18. *Xanthospilopteryx incongruens*, Butl. (Pl. XV., fig. 6 ♂, fig. 7 ♀).

Eusemia incongruens, Butl., Proc. Zool. Soc. Lond., 1878, p. 381.

Exp. 2¼ in.

Fore wings black, with ochraceous markings. Hind wings reddish orange or yellow (perhaps faded), with black borders. Markings nearly as in *X. Fatima*, but the bluish costal streak is wanting; spot 1 has only one other below it, above the submedian nervure; and the apical spot is subparallel, and not distinctly indented on the inside.

Hab. Abyssinia. B. M.

19. *Xanthospilopteryx superba*, Butl.

Eusemia superba, Butl., Ann. Nat. Hist. (4), xv., p. 141, pl. xiii., f. 3 (1875).

Xanthospilopteryx Geryon, Wallengr., Vet. Akad. Handl. (2), v. (4), p. 7 (1865).

Exp. 2½—2¾ in.

Resembles the last two species, but spot 1 is larger, crossing the median nervure, and instead of spot 4 being a long dash on the inner margin, it is an irregular spot, running obliquely upwards across the submedian nervure towards No. 1; the apical spot is broad, and not indented, and the base of the costa is marked with about 4 small white spots, under which stand 1 white one towards the base, and 2 yellow ones beyond. Hind wings red, with a black border, which deeply indents the ground colour. Instead of a yellow collar, there is a yellow tuft on each side above the base of the abdomen.

Hab. Zulu, Port Natal. B. M.

As explained above, this species is the type of the genus.

20. *Xanthospilopteryx Thruppi*, Butl. (Pl. XV., fig. 5).

Eusemia Thruppi, Butl., Proc. Zool. Soc. Lond., 1885, p. 775 (1886).

Exp. 2¾ in.

Resembles *X. superba*, but the head and thorax are marked with

orange, not white, spots, and all the small spots near the base of fore wings are ochraceous. Hind wings rose-colour below the median nervure and orange-tawny above, but perhaps faded; abdomen rufous.

Hab. Somali. B. M.

The rufous abdomen at once distinguishes this species.

21. *Xanthospilopteryx pardalina*, Walk.

Eusemia pardalina, Walk., Proc. Nat. Hist. Soc. Glasgow, i., p. 329, pl. v., f. 1 (1869).

E. ochracea, Butl., Ann. Nat. Hist. (4), xv., p. 142 (1875).

Fore wings black, with ochraceous spots; spots 1, 2, 3 and 6 more uniform in size than usual; spot 5 hardly indented within; an additional small spot above the submedian nervure between spots 1 and 4. Hind wings orange-tawny, with a black border, which indents the ground colour before the anal angle. Head and thorax black, spotted with white; base of costa with 2 or 3 small white spots; and one or two other small yellow spots below them; abdomen banded with black and yellow.

Hab. Congo. B. M.

Easily known by the orange-tawny hind wings.

22. *Xanthospilopteryx adulatrix*, Westw.

Eusemia adulatrix, Westw., Oates' Matabele-Land, p. 355, pl. G, fig. 1, pl. H, f. 3, 3*a*, 3*b* (1881).

Exp. 2¼ in.

Head and body black, and, as well as the base of fore wings, spotted with yellow, spot 1 being hardly larger than the others; spots 2 and 3 contiguous, forming a band, reaching nearly to the inner margin, on which spot 4 stands; spot 5 subparallel, slightly constricted in the middle; spot 6 rather large. Hind wings red, with black borders; abdomen banded with black and yellow.

Hab. "Prope Tati et Gavailo fluv."

Distinguished by the continuous central band, and (according to the figure) by the yellow spots on the head and thorax, which are represented by white ones in the allied species.

23. *Xanthospilopteryx Butleri*, Walk. (Pl. XV., fig. 4).

Eusemia Butleri, Walk., Char. Lep. Het., p. 111 (1869).

Exp. 1½ in.

Black; head, thorax, and base of fore wings, with small white spots; spot 1 well-marked, spot 2 the first of a band of 3, running to the hind margin; apical spot subparallel, hardly indented, spot 6 of moderate size. Hind wings crimson, with black borders; abdomen belted with orange.

Hab. Natal. B. M.

24. *Xanthospilopteryx Aisha*, sp. n. (Pl. XV., fig. 3).

Exp. nearly 2½ in.

Female. Fore wings black, with ochraceous spots of the same shade as in *E. superba*, Butl.; 3 small spots at the base of the costa, and 2 below the median nervure; just beyond there is a quadrate spot (No. 1) crossing the cell, and extending just above the subcostal nervure; and 2 smaller ones, resting on the submedian nervure; beyond these are 3 more spots (3—5), larger and oblong, one crossing the cell, and extending just above the submedian nervure; another placed obliquely, and rather beyond it, above the submedian nervure, and a smaller one, nearly below the first, on the inner margin. Nearer the apex is a long oblique band (5), not divided by the nervures, but constricted in the middle; and near the hinder angle is a pentagonal spot (6), with the point projecting outwards. Scattered pale blue scales form rather indistinct spots and lines at the base of the cell, and between the large spots in the cell, as well as a streak near the base, resting on the submedian nervure, and another between the median and submedian nervures, beyond the two basal spots resting on the latter. Fringes black, slightly shading into grey beneath, with a buff line at the apex. Posterior wings crimson, with a moderately broad black border, slightly sinuated on the inner side, and projecting into the wing before the anal angle; fringes ochraceous at the tip. Body black; head and thorax spotted with white; abdomen banded and tufted with yellow; legs yellow, spotted with black; tarsi ringed with black and white. Under side of fore wings with an ochraceous dash above the submedian nervure at the base, 2 spots beyond in the cell, a large spot in the cell, and another below, meeting it in a point; and the subapical band and spot at the anal angle nearly as above, but rather larger.

Hab. Masai Land (*H. C. V. Hunter*). B. M.

Nearest to *E. Butleri*, Walker, but considerably larger, and the spots of the fore wings larger in proportion, and differently arranged; thus, *E. Butleri* has a row of 3 spots arranged in a regular curve before the subapical band, instead of the 2nd being projected obliquely forward, as in *X. Aisha*, and the 3rd on the inner margin is less disproportionately small.

25. *Xanthospilopteryx pentelia*, Druce.

Eusemia pentelia, Druce, Proc. Zool. Soc. Lond., 1887, p. 668 (1888).

Exp. $1\frac{3}{4}$ in.

Fore wings rather pointed, black, with ochraceous spots; 4 in a square towards the base, apical spot subparallel, hardly indented; spot 6 rather large. Hind wings salmon-red, with black borders. Head and thorax black, spotted with white; abdomen belted with black and yellow.

Hab. Delagoa Bay. B. M.

Explanation of Plate XV.

Fig. 1. *Xanthospilopteryx indecisa.*
2. *X. Fatima.*
3. *X. Aisha.*
4. *X. Butleri.*
5. *X. Thruppi.*
6. *X. incongruens*, ♂.
7. ,, ♀.

XI. *The Rhynchophorous Coleoptera of Japan.* Part II. Apionidæ *and* Anthribidæ. By David Sharp, M.B., F.R.S., F.L.S., &c.

[Read February 4th, 1891.]

This part is, like Part I.,* drawn entirely from the materials obtained in the Archipelago by Mr. George Lewis.

APIONIDÆ.

Japan at present appears to be very poor in this division of the Rhynchophora, but this may be in part due to insufficient collecting; the comparatively short time Mr. Lewis spent in the islands could not allow of his doing full justice to all the smaller and more obscure beetles. He brought back only some fifteen species of the genus *Apion*, a number which contrasts strongly with that of the European fauna, there being fully two hundred species already detected in Europe proper. The number of specimens obtained by Mr. Lewis likewise is very small, whereas, in Europe, Apions are amongst the most abundant of beetles.

Apion abruptum, n. sp.

Affinis *A. opetici*, Bach. Plumbeo-nigrum, opacum, parce setosum, antennis articulis duobus basalibus rufis; rostro subtus in medio compresso-dilatato; prothorace conico, dense fortiter punctato, medio canaliculato. Long. absque rostro 3 mm.

Rostrum longitudinally convex above and swollen in the middle; underneath dilated and laterally compressed in the middle. Antennæ with the basal two joints red, the rest black, the first joint more than twice as long as the second. Thorax slender, the sides convergent in front, but nearly rectilinear, the hind angles very

* In Part I. (Trans. Ent. Soc. Lond., 1889), p. 42, line 6 from top, instead of "is absent and it is clear," read "is apparently absent but it is clear." As it stands at present the first part of the sentence may be construed as contradictory of what follows.—D. S.

inconspicuous, the surface very coarsely and closely punctate, with a longitudinal channel extending from the base to in front of the middle. Elytra rather deeply striate, interstices broad and flat, dull. Under surface less sparingly pubescent, lower and hind margin of orbit with numerous erect setæ. Legs, including the tarsi, black. In the male the rostrum is short, but in the female it is rather longer, and has a well-marked apical portion, which is much more slender and shining.

This differs from *A. opeticum* by the shorter rostrum, much more dilated in the middle, and provided with only a short apical part: this form of the rostrum also distinguishes it from *A. cerdo*, to which it is equally similar. Only a few specimens were obtained of *A. abruptum* at Junsai, Sapporo.

Apion japonicum.

Apion japonicum, Roelofs, Ann. Ent. Belg., 1874, p. 128.

Miyanoshita. This species remains extremely rare.

Apion unicolor.

Apion unicolor, Roelofs, Ann. Ent. Belg., 1874, p. 129.

Higo, Nowata, Subashiri.

Apion corvinum.

Apion corvinum, Faust, Stett. Ent. Zeit., 1889, p. 224.

Described on a single example, and said to be near *unicolor*. It has not been obtained by Mr. Lewis.

Apion lugubre.

Apion lugubre, Faust, Stett. Ent. Zeit., 1889, p. 224.

This was described from a single example of the ♂ sex: the small series obtained by Mr. Lewis shows that the ♀ has the rostrum still longer, and a little slender and more shining.

Hitoyoshi, Yuyama, in May; Nara, in June; Miyanoshita.

Apion protractum, n. sp.

Elongatum, angustum, plumbeo-nigrum, opacum, tenuiter pubescens; rostro elongato, curvato, punctulato, opaco. Long. absque rostro 2½, cumque rostro 3½ mm.

Antennæ inserted just behind the middle of the rostrum, first joint about three times as long as the second. Head long and narrow; eyes not prominent, remote from the thorax. Thorax small, slender, not greatly narrowed in front, coarsely punctate, with an elongate channel on the middle. Elytra moderately deeply sulcate; interstices quite flat, dull.

Shimonosiwa, July 31st, 1881. One specimen.

This very distinct species reminds one of *A. curvirostre*, but the Japanese insect is really very different, the rostrum and head being more slender, the thorax smaller, differently sculptured, and not constricted behind the front margin.

Apion bulbinasum, n. sp.

Nigerrimum, parcissime setosum, sat nitidum, elytris profunde sulcatis; rostro apicem versus dilatato, subtus membranaceo. Long. absque rostro 2¼ mm.

Of this most remarkable *Apion* only one example was procured, and I am not able to speak as to its sex: it has the apical portion of the rostrum thickened and inflated, while beneath the surface is hollow, and the chitinous integument is absent, the hollow being closed by a membrane. Except for this unprecedented structure of the rostrum the insect has nothing peculiar. The rostrum is about as long as the head and thorax, punctulate on the apical part, dull and impunctate on the basal part; the eyes are widely separated, the surface between them obsoletely striate: the antennæ are inserted about one-fourth of the length in front of the eye. The thorax is rather small, narrowed in front, a little rounded at the sides, coarsely punctate, with a fine short channel in front of the scutellum. Elytra with rather broad deep grooves, which are very indistinctly punctate; the interstices are slightly nitid, almost destitute of pubescence.

Sapporo; one example.

Apion sulcirostre, n. sp.

Nigrum, elytris sanguineis, circa scutellum margineque apicali nigricantibus, antennarum basi piceo-rufo, pedibus nigro-piceis; rostro crassiusculo, anterius in medio canaliculato. Long. absque rostro 2½ mm.

Rostrum short and stout, but little curved, nearly straight, quite dull, punctate, with a channel extending from the insertion of the antennæ to near the apex; antennæ inserted a little behind the middle, rather short. Thorax rather small, subconical, slightly

constricted near the front, dull, rugose-punctate, feebly impressed in front of the scutellum. Elytra narrow at the shoulders, convex, red, but black at the base, at the apex, and along the deflexed side margins, moderately deeply sulcate. Legs rather stout, claws of the tarsi lobed at the base.

Mr. Lewis found three specimens of this species at Subashiri; they are quite alike, and probably all of the male sex. It is one of the most readily recognised species of the genus, the colour and the canaliculate rostrum being diagnostic.

Apion griseo-pubescens.

Apion griseo-pubescens, Roelofs, Ann. Ent. Belg., 1874, p. 129.

Awomori.

Apion præcarium.

Apion præcarium, Faust, Stett. Ent. Zeit., 1889, p. 225.

Mr. Lewis obtained a small series of this species, but the only localities noted are Suyama and Kiga. There are also, in Mr. Lewis's collections, a few specimens that may be varieties of this species, or distinct forms.

Apion placidum.

Apion placidum, Faust, Deutsche Ent. Zeit., 1887, p. 180.

Described from E. Siberia, and said to be also found in Japan, but Mr. Lewis has not met with any specimen that I can refer to it.

Apion pallidirostre.

Apion pallidirostre, Roelofs, Ann. Ent. Belg., xvii., p. 128.

Konosè, May 18th, 1881.

Apion daimio, n. sp.

Convexum, nigrum, elytris disco rufo, pedibus rufo-testaceis, antennarum apice rufescente; rostro elongato, gracili, polito. Long. absque rostro, 2½ mm.

Rostrum rather longer than the head and thorax, slender, elongate, polished. Antennæ inserted as far in front of the eyes as the

width of the head and eyes, piceous, the slender club more dilute in colour ; eyes convex, but little separated in the middle. Thorax elongate, conical, greatly narrowed in front, not punctate, but bearing rather scanty, depressed, white hairs. Elytra subglobose, broadly and deeply sulcate, clothed like the thorax, and with a large common oblong red patch extending on each side as far as the fourth groove. Legs clear yellow. Middle coxæ widely separated.

A single example of this remarkable species was found by Mr. Lewis many years ago. It is not at all like any other Japanese species, nor any European species, that I know of, but comes much nearer to some of the Central-American species.

ANTHRIBIDÆ.

In *Anthribidæ*, Mr. Lewis was remarkably successful, as he has discovered about sixty species of the family. Geographical Europe only possesses about thirty species, so that the proportions to the whole coleopterous fauna are very different in the two regions. Whether the Japanese *Anthribidæ* are more allied to those of Asia than to those of Europe must remain at present an open question, as nothing is known of this part of the Chinese coleopterous fauna.

In reference to the way I have treated this family, it is necessary to remark that the classification of the *Anthribidæ* has not been touched since Lacordaire, and that as left by him it is amongst the most unsatisfactory of the order. This is due to several circumstances, the first of which is the natural difficulty arising from the fact that the generic characters vary from species to species, so that it is very difficult to decide where the lines of separation of genera should be drawn ; indeed, as we at present are acquainted with but a small proportion of the species, it is not to be expected that genera can be naturally defined by us. It must be admitted, too, that the choice of the leading characters for his divisions made by Lacordaire was no means a happy one, and he made it worse by not strictly defining the sense in which some of his terms were to be understood, and by himself in several cases misunderstanding them. Hence it is, perhaps, not surprising that I can find no satisfactory means of distinguishing *Tropideres*

and *Litocerus*, although Lacordaire placed them in different primary divisions. Finally, I may add that he did not make a complete revision of the family, but carried over, as it were, some of the faults previously existing in Schönherr's work. For instance, in the case of *Tropideres*, he admits the impossibility of defining it, and states that it cannot remain in its present condition, but makes no alteration in it.

Under these circumstances, I regret very much that I am obliged to refer about one-half of the Japanese *Anthribidæ* to this most unsatisfactory genus, especially as by so doing I increase the difficulty of either defining or dividing it; for I to some extent extend the limits of the structural variations included in it, while by describing some species intermediate between forms that might previously have been treated as generically distinct, the difficulty of dissolving the genus is increased.

This is not the first time I have felt the impossibility of dealing with this family in a satisfactory manner, and some years ago, when dealing with the New Zealand species, I endeavoured to evade the difficulty by treating all the species as belonging to the old genus *Anthribus*. And at that time the late Dr. Leconte informed me that he had experienced similar obstacles in dealing with the N. American forms. A complete revision of the classification of this family is certainly a pressing necessity, the confusion about it being at present very great.

ASEMORHINUS, nov. gen. (TOPHODERIDES, *Lacord.*).

Rostrum modice elongatum, apicem versus parum latius, scrobibus posterius fortiter convergentibus, profundis.

The insect for which I establish this genus appears from Lacordaire's table to be most nearly allied to *Tophoderes*, from which it differs decidedly by the very deep scrobes, which converge strongly behind so as almost to meet on the under side of the head, and, in addition to this, the apical dilatation of the rostrum is wanting. The antennæ are moderately long, with a three-jointed, moderately long and broad, club; the basal joint is impressed and curved in front, and is about as long as the second joint: the insertion is quite apical. The eyes are rather short and placed laterally. The præbasal carina of the thorax is slightly sinuous,

forms a very obtuse rounded angle at the sides, and is continued forwards for only a short distance. The middle coxæ are moderately distant, the junction of the meso- and metasterna between them very discontinuous. The sexual disparities are but slight.

Asemorhinus nebulosus.

Niger, griseo-tomentosus, albido fuscoque subvariegatus; rostro abrupto, suboblongo, apicem versus paulo latiore; prothorace lateribus rotundatis, anterius valde angustato. Long. cumque rostro 12—16 mm.

Antennæ of female reaching about to the back of the thorax, in the male longer; slender, the basal joint curvate and hollow in front; black, the two joints preceding the club bearing some white pubescence, the club rather slender, compressed, in the female with the three joints subequal in length, in the male the basal joint more elongate than the other two. Eyes prominent, subelliptic; rostrum at the base narrower than the head, distinctly broader towards the apex, the antennæ inserted at the apex; it is not quite so long as the thorax, covered with unicolorous grey pubescence, flat, feebly longitudinally carinate along the middle. Thorax greatly narrowed towards the front in a curvilinear manner, the præbasal carina strongly elevated, slightly undulate, not directed forwards at the side before reaching the side margin, with which it forms an obtuse angle, the latter not reaching the front; the surface is clothed with depressed hairs, but little variegate; across the middle are two or three indistinct elevations; the sculpture concealed by the clothing. Elytra more variegate than the anterior parts, with very coarse series of punctures, which are much obscured by the subdepressed clothing. Legs blackish, with whitish marks on the femora, tibiæ, and tarsi.

Found on *boleti* on a tree at Nara, 28th June, 1881; also at Yuyama, May 17th.

Blabirhinus, nov. gen. (Tophoderides, *Lacord.*).

Rostrum modice elongatum, apicem versus parum latius, scrobibus elongatis, posterius fortiter convergentibus, latis, perparum profundis.

Antennæ moderately elongate, with definite, rather short, three-jointed club; terminal in their insertion, second joint elongate, much longer than the first; eyes rather large, elongate, extending forwards but not inwards, very widely separated, very finely

facetted. Thoracic carina distant from the base, curved forwards on each side in an extremely gentle sweep, only very slightly prolonged anteriorly along the side. Middle coxæ moderately widely separated.

The insect for which this genus is proposed cannot be associated with *Ascmorhinus nebulosus* on account of the scrobes, which, though they nearly meet behind, are very shallow and broad; the basal joint of the antenna is short, almost globose, not curved. The third joint of the tarsi, looked at from above, can scarcely be seen, so that the feet look as if they were only three-jointed.

Blabirhinus dorsalis, n. sp.

Fusco-griseo tomentosus, thorace lineis nigro-fuscis, elytris pone discum nigro-signatis, antennis pedibusque nigris, his griseo-vestitis parum variegatis. Long. rostro porrecto 4½—7½ mm.

Elongate-oblong, rather flat. Antennæ in female quite as long as rostrum and thorax, in male rather longer; club rather broad, compressed, intermediate joint transverse. Thorax rather long, greatly narrowed in front, marked along the middle with two rather vague fuscous lines, which converge in front, and on each side with a shorter line; the præbasal carina distant from the base, and very prominent on each side. Scutellum covered with paler tomentum. Elytra marked with two short oblique dark stripes, converging towards the suture and behind each line with a small cruciform dark mark. Under surface not variegate, almost uniform in colour with the upper surface.

Higo, 14th May, 1881. Four specimens.

Ulorhinus, n. gen.

Rostrum breve, latum, modice deflexum, apice truncato; scrobes profundæ, foveiformes; antennæ parvæ, clava triarticulata.

This genus is proposed for an obscure Anthribid which seems to be intermediate between the two divisions into which Lacordaire divides his *Tropiderides*, the rostrum being short and broad, scarcely narrower than the head, and yet not abruptly deflexed, without a transverse impression beneath to limit it from the head. The position should be very near *Tropideres*. The rostrum is quite truncate in front, quite flat, not dilated at the extremity. The eyes convex, widely separated, a little convergent in front. Thoracic carina nearly straight, moderately

distant from the base, continued forwards at the sides for less than half the length. The scrobes are deep, and are prolonged inwards for a short distance, terminating in a very sharply-defined angle. The middle coxæ are moderately separated.

Ulorhinus funebris, n. sp.

Niger, parum variegatus, in elytris obscure albido-guttatus ; prothorace sat elongato, anterius leviter angustato, æqualiter convexo. Long. rostro subporrecto, 6 mm.

Antennæ short and rather slender, black, piceous at the base; first joint short, scarcely so long as the second, third to sixth slender, seventh and eighth a little broader, the latter short, ninth rather longer than broad, tenth transverse, terminal joint also rather short. Rostrum with a very shallow oval depression on the middle, rugose, with a very scanty dark clothing. Thorax gently narrowed in front in a slight curve, black, with a few white hairs in the middle in front, and some others at the base in front of the scutellum; the disc not impressed; the thoracic carina nearly straight, joining the lateral margin by a rectangle. Elytra rather short, with very indistinct elevations near the suture, and with indistinct white spots scattered on the surface. Legs rather stout, tibiæ and tarsi not variegate.

Chiuzenji, August, 1881. Two specimens.

Tropideres.

Tropideres, *Schonh.*, Disp. Meth., p. 35.
Litocerus, *Schonh.*, Gen. Curc., i., p. 125.
Acorynus, *Schonh.*, Gen. Curc., i., p. 123.

Lacordaire remarks correctly that this is a composite genus, for it undoubtedly contains species that differ much in facies, and in the minor characters. Although it will no doubt be divided, yet I think *Litocerus* will always be merely a synonym, as it is congeneric with the typical division of *Tropideres* (*T. albirostris*), although Lacordaire placed the two in different subfamilies. *Acorynus* is distinguished from *Litocerus* merely by the middle joint of the club of the antennæ being shorter, a character which Lacordaire considered correctly to be of insufficient importance for generic distinction.

Group 1. Thoracic carina slightly sinuous, nearly equidistant from elytra for all its width: eyes placed more or less on the anterior aspect of the head. Species 1—8.

1. *Tropideres rugirostris*, n. sp.

Niger, ochraceo-variegatus, rostro lato, plano, anterius fortius dilatato, rugoso, nigro, medio superne ochraceo; antennis testaceis, articulis basalibus clavaque nigricantibus, hac in mare valde elongata, lineari. Long. cumque rostro 11 mm.

Rostrum densely rugose, black, dull; eyes but little separated, each margined internally with an ochraceous line, which converges, meeting its fellow at the front of the eyes, and so forming a broad line, which is continued a little forward along the middle of the rostrum. Thorax broad, greatly narrowed in front, coarsely rugose, black, with a transverse impression on the disc, on either side of which there is an ochraceous mark; there is a quadrate pale mark in front of the scutellum, and a few minute spots; the præbasal carina is nearly straight, is bent forwards at the side, forming a rounded angle, and ceases suddenly about the middle, so as to leave there a sort of denticular prominence. Elytra black, but with large irregular ochraceous marks that cover half the surface; with series of punctures that are fine near the suture, coarser towards the sides, especially in the middle. Pygidium ochraceous. Legs slender, black; femora with a pale mark in front, tibiæ with a long pallid ring near the base; basal joint of tarsi elongate, pallid, but black at the tip. Metasternum with a large pallid spot on each side; ventral segments with two rows of spots. In the male the antennæ are slender, about 8 mm. long, the club very elongate, scarcely broader than the preceding joints. In the female the intermediate joints of the antennæ are darker in colour, being piceous yellow, and the club, though very elongate, is not so slender as it is in the male.

Only three examples of this remarkable *Tropideres* were procured; one each at Nikko, Chiuzenji, and Junsai, in June.

2. *Tropideres roelofsi*.

Litocerus roelofsi, Lewis, Ann. Nat. Hist, 1879, p. 465.

Although there is very little to distinguish *Litocerus* from *Tropideres*, this elegant insect is better placed in the latter division. It appears to be very rare, but has

been met with at Nagasaki, Kiga, and Higo in single examples.

3. *Tropideres latirostris*, n. sp.

Niger, ochraceo-variegatus, rostro in faciem externam capiteque sub oculos griseo-vestitis; antennarum clava valde elongata, articulis inæqualibus, intermedio transverso. Long. rostro deflexo 8—9 mm.

This *Tropideres* may be at once identified by the peculiar construction of the club of the antennæ, the first and third joints of this part being very elongate, while the intermediate one remains quite short; the intermediate joints are slender, each reddish in colour, marked with fuscous. The rostrum is very broad, covered with very minute cinereous or griseous tomentum, this colour extending between the eyes, while below each eye there is a patch of similar colour. The thorax is not coarsely sculptured, and bears several small obscure spots of an ochraceous colour. The elytra are much variegate, in a complex manner, with a similar colour, and the tibiæ and tarsi are marked with pallid rings. The male has a well-marked mucro at the extremity of the inner face of the middle tibia, and the eyes in front are separated by a smaller interval than they are in the female.

Nikko in June, Kiga, Higo, Oyayama at the end of March; Kurigahara, 5th of August. One specimen marked as being found under bark of pine.

The structure of the club of the antennæ is similar to what exists in *Acorynus*.

4. *Tropideres japonicus*.

Litocerus japonicus, Roel., C. R. Ent. Belg., xxii., p, lv.

This species as yet has been found only by Hiller at Tokio. I do not know why it was placed in *Litocerus*, as it is extremely closely allied to *T. albirostris*, the type of the genus *Tropideres;* it may, however, be distinguished from it, as well as from the following species, by the antennæ being rather more slender and pallid in colour, with a rather longer basal joint to the club, and by the upper surface being clothed with a very delicate more fuscous tomentum, which is very indefinitely variegate. I have been able to inspect a small series of the examples found by Mr. Hiller, and I cannot see any variation,

except that the males have the eyes very approximate in front, and a mucro directed inwards on the inner margin of the extremity of the middle tibia. I have dissected out the copulatory organs of a male example, and they leave no doubt that *T. japonicus* is quite distinct from *T. albirostris* and *T. vilis*.

5. *Tropideres laxus*, n. sp.

Niger, rostro in faciem anteriorem capiteque sub oculos albido vel ochraceo-tomentosis; elytris guttulis paucis parvis ornatis; antennarum clava gracili, laxe articulata. Long. rostro deflexo 8—9 mm.

This differs from the following three species by the more elongate, slender, and less compact club to the antennæ, and also by a distinct difference in the direction of the præbasal carina of the thorax, as well as by the eyes being a little more distant. The three joints of the club of the antenna are subequal in length, and all are slender, each much longer than broad. The thoracic carina is widely separated from the base in the middle, but on each side becomes slightly more approximate to the base, instead of more distant from it as it is in the following species; there is a large quadrate ochraceous mark in front of the scutellum. The elytra have a very small pallid mark adjacent to the scutellum, and each, just behind the middle near the suture, has a small but conspicuous white mark. The legs bear rings of pallid colour, there being two such rings on each tibia.

It seems difficult to distinguish the sexes in this species; indeed, I have not detected any certain external distinctions: the club of the antennæ is more elongate in certain examples, but I fancy this is, in *T. laxus*, not a sexual variation. The colour of the pallid clothing of the rostrum and head varies considerably, and the small pallid marks on the elytra are by no means similar in all the examples.

T. laxus was found in small numbers in several localities from Yezo, southwards to Yuyama.

6. *Tropideres germanus*, n. sp.

Niger, elytris parum ochraceo-variegatis, rostro capiteque sub oculos subtiliter griseo-tomentosis; antennis parum elongatis, clava mediocre. Long. rostro subdeflexo 6—7 mm.

Var. *α*, capite rostroque sub oculos niveo-tomentosis, elytris albido-variegatis.

Var. *β*, minus variegatus, rostro capiteque parum tomentosis.

This species is closely allied to the European *T. albirostris*, but the club of the antennæ is a little longer, and the white marks on the posterior part of the elytra are small and disconnected, and do not form a large common patch as they do in *T. albirostris*.

I refer to *T. germanus* a series of about a dozen examples, but if they are all one species, it is a very variable one in colour. The specimens I have treated arbitrarily, as the types were found at the Moon Temple, Kobé, and at Buno, in the end of August, 1881; these are the most different in appearance from *T. albirostris*. Three examples, which I have little doubt are the same species, though they differ in the colour of the elytra and their markings, were found at Nikko, Yuyama, and Kashiwagi. The two very different-looking individuals I have treated as var. *α* were found at Sapporo, and the exponents of var. *β* at Junsai.

7. *Tropideres vilis*, n. sp.

Niger, fere concolor; antennis brevioribus, clava brevi. Long. 5 mm.

This differs from *T. germanus* by the smaller, less variegate, surface, and by the shorter basal joint to the club of the antennæ. It scarcely differs in any important point from *T. albirostris*, though the different colour of the head, rostrum, and apical part of the elytra render them very distinct on superficial inspection.

A few specimens were found in the Island of Yezo, Hitoyoshi, and Kashiwagi.

I am by no means sure as to the validity of the distinctions between these two Japanese forms and *T. albirostris*. I have examined the male organs in them, but these do not settle the point, as, though they exhibit certain differences, it is quite possible these may not be constant, and they are but slight.

8. *Tropideres flabellicornis*, n. sp.

Niger, elytris ad summam apicem pygidioque albidescentibus; antennis articulo ultimo brevi transverso, maris articulis 5o—11m dilatatis, subtus hirtellis. Long. 7—9 mm.

There is nothing to distinguish this insect generically from *Tropideres albirostris*, except the structure of the antennæ of the male, and I prefer therefore not to establish a new genus for it. The rostrum is very short, formed as in *T. albirostris* and *vilis*, and the eyes are similar in form and position to what they are in the species named. The antennæ are black, with the basal joint short, rather shorter than the second, the seventh bearing some white pubescence; in the male the joints from the fifth onwards are dilated and flattened, and on the under side are hirsute; in the female they bear a broad three-jointed club, the terminal joint being a good deal smaller than those preceding it. The form of the thorax and its carina are like those of *T. albirostris*. The elytra have a very feeble elevation of the surface—not amounting to a tubercle—at the base of each near the suture. The under surface is not variegate. The tibiæ are obscurely variegate, the basal joint of the tarsi more distinctly white.

Mr. Lewis obtained a small series of this species at Junsai in the Island of Yezo.

Group 2. Thoracic carina consisting of two curves, united in front of the scutellum so as to form a sharp angle there. Antennæ thick. Species 9.

9. *Tropideres crassicornis*, n. sp.

Niger, rostro valde deflexo, niveo, elytris ad basin plaga magna, communi, pallida; antennis crassiusculis, clava parum latiore, articulis duobus ultimis brevibus. Long. 5—5½ mm.

Antennæ stout, the first joint of the club as long as the following two together. Rostrum moderately long, much dilated at the extremity, densely covered with snow-white pubescence, which extends backwards under the eyes. Thorax much narrowed in front, the surface uneven, the carina placed near the base, strongly angulate in the middle, and deeply sinuate at each side. Elytra with a large elevation on each near the scutellum, and with the third interstice strongly elevated on the declivous part; blackish in colour, but with a very large pallid patch occupying a large portion of the basal area, also obscurely variegate near the apex. Legs stout, but little variegate. Under surface clothed with pallid pubescence.

Of this very distinct species, two examples, of the male sex, were found at Junsai.

Group 3. Thoracic carina forming a curve with its convexity forwards, and so more approximate to the elytra at the shoulders than at the scutellum. Antennæ short; eyes placed chiefly on anterior aspect of the head. Species 10.

10. *Tropideres rufescens.*

Litocerus rufescens, Roelofs, C. R. Ent. Belg., xxii., p. lv.

This insect agrees with *T. sepicola* in the shape and position of the thoracic carina, but differs greatly therefrom in the form of the rostrum and the position of the eyes, and in these points comes nearer to *T. albirostris*; the antennæ are rather slender, but the club, although not broad, is well marked; the middle coxæ are widely separated.

Group 4. Thoracic carina slightly sinuous, the thorax abruptly narrowed behind it, so as to appear separated by a deep excision from the elytra. Eyes lateral. Species 11—13.

11. *Tropideres brevirostris*, n. sp.

T. niveirostris proxime affinis; niger, griseo-fusco tomentosus, minus variegatus, rostro anterius albidescente; elytris obsolete tuberculatis; thoracis carina præbasali subrecta; antennis pedibusque rufescentibus parum variegatis. Long. rostro subdeflexo 4 mm.

This is very closely allied to *T. niveirostris* and to *T. nodulosus*, but I cannot consider it at present as a variety of either; its surface is more obscurely coloured and less variegate, and it differs also from *T. niveirostris* in that the thoracic carina is considerably less deflexed backwards at the sides; the white colour on the beak does not extend backwards between the eyes. From *T. nodulosus* it is readily enough distinguished by the obscure colour, and by the fact that the apical nodule of the elytra is absent.

Sapporo. Only one specimen was met with, and unfortunately it is in bad preservation.

12. *Tropideres nodulosus*, n. sp.

T. niveirostris proxime affinis; niger, pervariegatus, elytris nodulosis; rostro nivescente. Long. rostro deflexo 4½ mm.

Although very closely allied to *T. niveirostris*, this is, I have no doubt, a distinct species; the surface is more variegate in colour, and the three nodular elevations placed in a line on each elytra are very large; the thoracic carina is at each side less deflexed backwards. The thorax is separated from the elytra by an angular incision on each side, as in *T. niveirostris*.

13. *Tropideres incisus*, n. sp.

Brevis, latus, fusco nigroque variegatus, rostro albidescente, tuberculatus; prothoracis carina præbasali a basi longe remota, thorace ab elytris incisura profunda separato. Long. rostro deflexo 5½ mm.

Antennæ rather short and slender, red, with the club darker, the first joint of this latter part elongate, second about as long as broad, terminal joint rather shorter. Rostrum very short and broad, dilated over the insertion of the antennæ, whitish; eyes widely separated, but convergent. Thorax short and broad, greatly narrowed in front, its carina very conspicuous, placed far in front of the base, straight in the middle for the greater part of its length, towards the sides very slightly directed backwards, not continued forwards along the sides; behind the carina the thorax is greatly narrowed so as to leave a deep excision between it and the elytra. Elytra with an elongate subcariniform elevation at the base of each near the suture, and behind the middle with a smaller elevation; the general colour is blackish, with the apex, the summit of the basal elevations, and a small patch round the scutellum, brownish. Pygidium tawny. Legs feeble, variegate. Middle coxæ widely distant.

This elegant insect is allied to *T. niveirostris*. Only two specimens were met with at Ichiuchi, 1st May, 1881, and Omama, 27th August, 1881.

Group 5. Thoracic carina nearly straight, forming a well-marked angle at the sides; thorax not excised behind. Eyes lateral above, but convergent below. Species 14, 15.

14. *Tropideres aberrans*, n. sp.

Subcylindricus, rufescens, variegato-tomentosus; rostro antennisque brevibus, oculis posterius valde distantibus, anterius convergentibus; prothorace carina præbasali subrecta. Long. 5 mm.

Antennæ short, red, joints 3—8 darker; club rather long, moderately broad, loosely articulated, formed of three subequal joints. Rostrum very short, broad, transverse, its clothing pallid but not white. Eyes very widely separated behind, but converging abruptly, and in the male only slightly separated in the middle, though in the female separated by a space about half the width of the rostrum. Thorax gently narrowed in front, feebly variegate, the præbasal carina not widely distant from the base, exhibiting in the middle a very slight angle directed towards the scutellum, forming at each side an angle, which is nearly rectangular, and continued forwards along the side in a marked manner for quite half the length. Elytra feebly variegate, with four obsolete elevations placed behind one another from base to apex near the suture; these elevations are black in colour, and there are some other minute black flecks. Legs red, but variegate. Under surface nearly black; middle coxæ widely separated.

15. *Tropideres confinis*, n. sp.

T. aberranti peraffinis; subcylindricus, nigricans, minus variegatus, rostro antennisque brevibus, his basi rufescente, illo anterius fulvo tomentoso; oculis posterius valde distantibus, anterius convergentibus; prothorace carina præbasali subrecta. Long. 4½ mm.

This appears to be structurally very closely allied to *T. aberrans*, though so different in colour. The club of the antenna is quite black; there are some vague tawny marks placed parallel to one another at the base of the elytra, and the deflexed apex and the pygidium are quite covered with pallid setosity.

Hitoyoshi, 3rd May, 1881. A single specimen. I presume it to be a male, though the eyes are rather less approximate in front than they are in that sex of *T. aberrans*.

Group 6. Thoracic carina nearly straight, forming at the side a very obtuse and rounded angle; eyes lateral, prominent. Species 16, 17.

16. *Tropideres distinguendus*, n. sp.

Subcylindricus, niger, tomentosus, supra pallide griseo-fuscoque variegatus, antennis minus tenuibus, rufescentibus, extrorsum fuscescentibus; carina thoracis subrecta, ad basin approximata. Long. rostro porrecto 4 mm.

Antennæ rather stout, the three joints of the club rather laxly articulated, none of them elongate. Rostrum subquadrate, only very slightly narrowed at the eyes; these lateral, encroaching in front a little on the rostrum. Thorax elongate, gently narrowed in front, the carina nearly straight, but little distant from the elytra, joining the lateral margin at an obtuse and rounded angle. Elytra with the clothing rather coarse, pallid, but much marked with fuscous; with a feeble basal elevation. Tibiæ reddish, not variegate. Prosternum short, middle coxæ not widely separated.

A small series of this little Anthribid was obtained from widely separated localities. Nagasaki in April, Kiga and Miyanoshita in May, Yokohama, Junsai.

The insect, though not described by M. Roelofs, was known to him, and marked by him as a new genus, and it will no doubt be separated from *Tropideres* when that composite genus is dismembered; a course that appears to be, though inevitable, at present impracticable.

17. *Tropideres basipennis*, n. sp.

Subcylindricus, nigricans, tomentosus, griseo pallideque rufo variegatus, antennis sat crassis; prothoracis carina præbasali subrecta; elytris mox pone marginem basalem profunde transversim impressis. Long. rostro porrecto 6 mm.

This insect seems structurally closely allied to *T. distinguendus*, but possesses a peculiar character that distinguishes it from that species, as well as all others, inasmuch as there is profound transverse depression at the base of each elytra, and the basal margin being elevated in front of this, and projecting on the base of the thorax, appears as if it were a portion of the latter. The rostrum is short, but a good deal dilated at the apex, the antennæ rather stout, with broad, rather long, three-jointed club; the thoracic carina is nearly straight, and is directed forwards at the sides by an extremely gentle curve. Elytra greatly variegate, but without definite pattern; without elevations. Middle coxæ but little separated.

Kurigahara, 6th August, 1881. One specimen of the female sex.

Group 7. Thoracic carina nearly straight, very close to the elytra, forming an acute angle on each side. Species 18.

18. *Tropideres debilis*, n. sp.

Fuscus, pallido-rufo-signatus, rostro parcius albido-vestitus, antennis testaceis, articulis 3o—5m clavaque fusco-testaceis; prothorace subconico, carina subrecta ad basin approximata. Long. rostro porrecto 4 mm.

Antennæ slender, with elongate loosely-articulated club, the first joint of which is longer than either of the two others, these subequal in length. Rostrum quadrate, flat, the head sparingly clothed with white pubescence, the eyes widely distant behind, much convergent in front, but there separated by about half the width of the rostrum. Thorax gently narrowed in front, not impressed nor deplanate on the disc, largely marked with rather indefinite pallid spots; the carina placed very near the base, sharply elevated, straight, joining the lateral margin by a sharply-marked rectangle. Elytra destitute of elevations, fuscous, much marked with pallid maculæ of angular form, and of a faint pink tinge. Legs rufescent, vaguely variegate. Prosternum very short. Middle coxæ widely separated.

I must at present treat this insect as an aberrant species of *Tropideres;* it differs therefrom by the shorter prosternum, and by the thoracic carina; but as there is considerable variety on these points in *Tropideres*, it is better not to separate *T. debilis* at present. The thoracic carina is similar to that of *Cratoparis*, except that it is slightly separated from the elytra.

Two examples were found at Junsai. From their very mutilated condition it is probable that they were cut out of wood. A third specimen, found at Chiuzenji, I treat as a variety, though it is rather broader, and appears to have the thoracic carina a little more distant from the base.

Group 8. Thoracic carina nearly straight; eyes very widely separated on the vertex; funiculus of antennæ very slender. Species 19, 20.

19. *Tropideres cylindricus*, n. sp.

Subcylindricus, fuscus, elytris variegatis, ad latera rufo-pallidis; antennis pedibusque pallide rufis, his tenuibus, clava tenuissima,

elongata, laxe articulata ; thoracis carina præbasali in medio subangulata. Long. rostro subporrecto 4½ mm.

Antennæ very slender, joints 3—8 very elongate and slender even the eighth three times as long as broad; the club infuscate, sparingly setose, its three joints subequal in length, the point of articulation between each of them very delicate. Rostrum very short, transverse, sparingly clothed with fine pubescence; eyes very widely separated behind, but strongly convergent in front, where they are separated by less than half the width of the rostrum. Thorax slender, subconical, gently narrowed in front, disc not deplanate or impressed; the carina strongly developed, nearest to the base in the middle, thence very slightly divergent on either side, but without any sinuation or distinct curve, joining the lateral margin by a slightly obtuse angle. Elytra slender, much variegate, the colour being pallid red at the sides, nearly black about the suture, and bearing vague maculations; without elevations. Legs rather stout, pale red (including the tarsi), very indistinctly variegate. Prosternum short, middle coxæ but little separated.

Four specimens. Nagasaki and Nara in June, Junsai ; Oyama, 1st June, 1881.

There can be no difficulty in identifying this species, which is by no means near to any other.

20. *Tropideres longipes*, n. sp.

Convexus, nigro-fuscus, maculis pallidis numerosis sat variegatus; antennis tenuibus, testaceis, clava nigricante laxe articulata; thoracis carina leviter arcuata, utrinque ab elytris divergente. Long. rostro subporrecto 7 mm.

Antennæ with joints 3—8 very slender, even the eigthth three times as long as broad; the club well marked, but long and slender, composed of three subequal, laxly-articulated joints, dark in colour. Rostrum very broad, quadrate, straight at the sides, covered with fine griseous setosity, which is not sufficiently marked to give a predominant colour; eyes very widely separated, convex, a little convergent in front. Thorax rather elongate and narrow, a little narrowed in front, coarsely punctate, but little variegate, the carina feebly curved, the curve extending slightly away from the elytra on each side, where it is distinctly sinuate, then directed forwards with a very rounded angle, and continued only for a very short distance forwards. Elytra convex, rather narrow, rusty-black in colour, with numerous small pallid spots, which are not

conspicuous; without elevations. Legs rather stout, elongate, black; the tibiæ with a pallid ring in the middle, the tarsi variegate. Middle coxæ not widely separate. Breast of the male covered with densely-set black scales, giving it an appearance somewhat like the surface of a file.

Junsai, Sapporo; Chiuzenji, 23rd August, 1881. Seven specimens.

This is another very distinct species.

Group 9. Thoracic carina forming a curve with the convexity forwards; eyes very widely separated above, convergent below; antennæ rather small. Species 21.

21. *Tropideres pardalis*, n. sp.

Convexus, nigro albidoque variegatus; antennis parce setosellis, tenuibus, parum elongatis, testaceis, clava fusca, laxe articulata; thoracis carina subcurvata, utrinque ad elytra subapproximata. Long. rostro deflexo 6½ mm.

Antennæ with the first and second joints much shorter than the others, subequal, 3—8 each extremely slender, even the eighth three times as long as broad; club slender, dark in colour, formed of three laxly-articulated joints. Rostrum short and broad, densely covered with ashen white pubescence; eyes large, convex, strongly convergent in front. Thorax convex, gently narrowed in front, without visible sculpture, black, white at the sides, the thoracic carina forming a curve the extremities of which are directed towards the elytra, continued forwards at the sides in an acute angle, the angle itself, however, being rounded. Elytra black, with a large number of ashen white marks, forming a complex but indefinite pattern; without elevations. Legs black, much variegate; femora largely covered with white tomentum, tibiæ with a very broad white ring, tarsi much variegate. Under surface ashen white; prosternum short, middle coxæ not widely separated.

There is no other species at all like this one. Only one pair was met with; at Sapporo and Junsai.

Group 10. Minute insects with long antennæ; thoracic carina forming two curves; thorax excised behind the carina. Species 22, 23.

22. *Tropideres guttifer*, n. sp.

Niger, supra maculis parvis pallidis ornatus, subtus subtiliter albido-vestitus; antennis tenuibus, clava perelongata; thoracis carina a basi remota, bicurvata. Long. rostro deflexo 3¼ mm.

Antennæ black, slender, elongate; club very long, its first joint longer than the seventh and eighth together, tenth and eleventh joints subequal, each distinctly shorter than the ninth. Rostrum short and broad, transversely impressed across the front, dark in colour, with some delicate pallid pubescence near the eyes, most distinct at the vertex; eyes encroaching on the front, but separated by half the width of the rostrum. Thorax gently narrowed in front, marked with some widely separated small spots of pallid pubescence; the carina remote from the base, forming two curves, with their convexities forwards, which meet in the middle in an excessively obtuse angle; the hind angles prominent, so that an incision exists between the bases of the thorax and elytra on each side. Elytra black, with numerous small flecks of pallid pubescence. Under surface uniformly covered with delicate pallid pubescence. Middle coxæ moderately widely separated.

Nagasaki, 14th February, 1881. Two specimens.

This and the following species are allied to the European *T. cinctus*.

23. *Tropideres concolor*, n. sp.

Niger, subtiliter griseo-pubescens, haud variegatus; antennis elongatis, clava elongata, angusta; thoracis carina a basi remota, bicurvata. Long. rostro deflexo vix 2½ mm.

Mas. Femora intermedia posterius rotundato-dilatata; abdomine segmentis 1—4 medio longitudinaliter impressis.

This differs from *T. guttifer* in being smaller and uniformly covered with pallid pubescence; the ninth joint of the antenna is but little longer than the seventh; this latter distinction may be sexual, as the unique example of *T. concolor* is a male, while the two specimens of *T. guttifer* are females. The middle coxæ are rather less widely separated in *T. concolor;* the thoracic carina is similar.

Yokohama, April, 1880. One specimen.

Group 11. Minute insects with delicate but not long antennæ; thoracic carina forming two curves, following the outlines of the bases of the elytra and

approximate thereto ; the hind angles acute and near to the elytra. Species 24—28.

24. *Tropideres pectoralis*, n. sp.

Niger, supra griseo-subvariegatus, rostro albido-tomentoso; antennis pedibusque testaceis, illis gracilibus elongatis, his femoribus fuscis ; prothoracis carina bisinuata, ab elytris parum remota. Long. rostro subporrecto 3½ mm.

Antennæ yellow, rather elongate and slender, with long slender club of three subequal joints. Rostrum broad and short, clothed with white silky tomentum, this colour extending upwards between the eyes, these latter separated in front by about one-half the width of the rostrum. Thorax rounded at the sides and narrowed in front, dull fuscous black, ashen white about the sides, the carina forming in the middle a gentle curve, not at all angulate, sinuate on each side, the angles free and slightly projecting. Elytra fuscous black, much variegated in an irregular manner with griseous pubescence. Tibiæ and tarsi yellow. Under side uniformly covered with pallid pubescence ; the middle coxæ moderately distant, the mesosternum produced between them as far as the middle of the metasternum.

Kashiwagi, 22nd June, 1881 ; Kurigahara, 5th August, 1881 ; Nikko, Junsai. One specimen from each locality.

This species can be readily distinguished by the peculiar prolongation backwards of the mesosternal process ; on the upper side the readiest means of identifying it will be found in the white pubescence of the front of the head and rostrum.

25. *Tropideres truncatus*, n. sp.

Nigro-fuscus, supra parum distincte variegatus, rostro parcius griseo-tomentoso, antennis pedibusque testaceis, illis gracilibus sat elongatis, his femoribus fuscis; prothoracis carina bisinuata, ab elytris parum remota. Long. 2½—3 mm.

This obscure insect is excessively similar to *T. pectoralis*, but may be distinguished on the upper side by the front of the head and rostrum not being white; while beneath it differs by the mesosternal process being truncate just in front of the middle coxæ, instead of being prolonged between them.

I have both sexes of *T. truncatus* before me ; the male

has the antennæ slightly longer, and the ventral segments more abbreviate in the middle than they are in the female. The species apparently varies a good deal in colour and size.

Kashiwagi in June, Kurigahara and Chiuzenji in August. Also one example found on an old plum tree at Nagasaki in 1886. Nine specimens.

26. *Tropideres bruchoides*, n. sp.

Brevis, subconvexus, plus minusve tenuiter griseo-pubescens; elytrorum sutura ad basin albido-tomentosa; antennis gracilibus clava sat elongata; prothoracis carina bisinuata ab elytris parum remota. Long. rostro deflexo 3 mm.

Closely allied to *T. pectoralis* and *T. truncatus*, and agreeing with the latter in the structure of the breast, distinguished from both by the dark colour of the legs and antennæ. The rostrum is short and broad, strongly deflexed, the eyes very distant; the club of the antennæ moderately long, loosely articulated, not so slender as in *T. pectoralis*, the tenth joint about as long as it is broad. The thorax is rather short and broad, narrowed in front, gently curved at the sides, the surface a little depressed in front of the carina; this is very near to the scutellum in the middle, and diverges a little on either side. The elytra are deeply striate, and have a small pale common linear mark on the suture at the base. Legs black; basal joint of the tarsi as long as the following three together.

Kashiwagi, in June. Four specimens.

27. *Tropideres imperfectus*, n. sp.

Brevis, niger, fere concolor, antennis brevibus, clava minuta; prothoracis carina, bicurvata, ab elytris sat remota. Long. 2½ mm.

This minute insect is essentially distinguished from its allies by the minute club to the antennæ, and by the eyes being much more approximate. The antennæ are short, the basal joint nearly entirely concealed, the club small and compact. The rostrum is very short, and the eyes are separated by only one-fourth of its width. The carina of the thorax is very distinct, and follows the outline of the bases of the elytra by two strong curves, which meet together in the middle so as to form a well-marked angle. The metasternum is short, and in the male the ventral segments are very much abbreviated in the middle, the pygidium being strongly inflexed.

Kashiwagi, 16th June, 1881; one specimen. Also two examples from the collection made by Mr. Lewis in 1869.

28. *Tropideres difficilis*, n. sp.

Niger, tibiis anterioribus et intermediis piceis, antennarum clava sat elongata; prothoracis carina bicurvata, ad basin valde approximata. Long. $2\frac{3}{4}$ mm.

This resembles *T. bruchoides* and *T. imperfectus;* it is distinguished from the first by its smaller size, narrower form, and the shorter antennæ, the eighth joint of which is markedly smaller; at first sight it more resembles *T. imperfectus*, but is radically distinct from it by the position of the eyes, by the nature of the antennal club, and by the thoracic carina being very near to the base, so that in some positions it almost touches the elytra. The three joints of the club are of subequal length, the tenth about as long as broad. The rostrum is very short, very finely sculptured, the eyes separated by the greater part of its width. The thoracic carina closely follows, in two curves, the outlines of the base of the elytra, and its angles project backwards rather than outwards. The striation of the elytra is coarse even at the base.

Kashiwagi, in June; Fukushima, in July.

Xylinades japonicus, n. sp.

Minor, fulvo fuscoque variegatus, pedibus rufis, antennis piceis; prothorace tuberculato-rugoso, carina præbasilari curvata; elytris profunde, subtiliter striatis, striis subtiliter tuberculatis. Long. cumque rostro 10 mm.

Antennæ short, the terminal joint compressed, acuminate in one direction, covered with a pallid silky pubescence; the penultimate joint also silky, strongly transverse, the basal joint of the club twice as long as the penultimate joint, dark in colour, like the rest of the antennæ. Head with a deep longitudinal impression along the middle, this impression divided behind into two by a broad polished elevation. Thorax about as long as broad, greatest width a little in front of the middle, thence a good deal narrowed behind close to the front abruptly narrowed; the surface covered with tubercular rugosities; the præbasal carina not in the least angulate in the middle. Elytra tawny, with some dark marks; these are variable, the most conspicuous being a large one on each side just behind the middle, extending inwards towards the suture, so that the two almost connect at the suture; the striæ very fine, and tubercles in them small.

The smallest species known to me of the genus. Only two examples were produced, 16th May, 1881. Yuyama.

Eucorynus colligens, Walker, Ann. Nat. Hist. (3), iii., p. 261.

Higo; one specimen.

In this species there are only three joints in the club of the antennæ, though in the books the genus is chiefly defined by the club being 4-jointed.

Apolecta lewisii, n. sp.

Niger, supra grisescens, elytris post medium fascia lata irregulari nigra. Long. capite porrecto 8—9 mm.

This insect is smaller than any other I have seen of the genus. The antennæ of the male are four or five times as long as the body, of the female about one and a half times; they are excessively slender except the basal two joints, scarcely any club exists, but the tenth and eleventh joints, together with the apical portion of the ninth, are slightly less slender, and are densely covered with fine sensitive pubescence; the nodose thickening of the apex of each joint is very slight, and after the third joint is scarcely perceptible. The upper surface is sparingly clothed with griseous pubescence, more densely so on the elytra, and just behind the middle of these latter there is a broad very conspicuous dark fascia; except for this the variegation is but slight; there are, however, some small dark specks on the elytra, and the tomentum on the thorax is not evenly distributed. The thorax is longitudinally carinate along the middle from the apex to near the base, and somewhat depressed on each side of the carina; the præbasal carina is very near to the base in the middle, and diverges on either side; it is curved forwards in a very gentle curve, and continued only for a very short distance on the side.

Nikko and Kashiwagi in June, Kurigahara in August; Junsai.

Mr. Lewis secured a small series of this very elegant insect.

Anthribus.

The name of this genus is replaced, in the Munich Catalogue, by that of *Macrocephalus*, Oliv., but I prefer to follow Lacordaire, and continue to use the name by

which our well-known European species has been long distinguished.

Anthribus daimio, n. sp.

Elongato-oblongus, niger brunneo albidoque variegatus, elytris dorso apiceque late albidis. Long. rostro porrecto 10—12 mm.

Closely allied to *A. albinus*, but rather larger and more elongate, and with a much greater extent of white colour on the front of the thorax and on the middle of the elytra. The rostrum and head are covered with white tomentum, and there is much of this colour on the anterior parts of the thorax; there are three small brown tufts on the disc of the thorax, and the middle one is tipped with black. In front of the middle of the wing-cases there is a large white common patch, and the extremity is broadly white; there are four small black tufts in a line on each elytron. The legs and antennæ are black, variegated with white; the club of the latter in the male is very long and acuminate.

Yokohama in June, Kobé in July, Kurigahara in August; Junsai.

Phlœobius apicalis.

Anthribus apicalis, Walk., Ann. Nat. Hist. (3), iii., p. 262.

Mr. Lewis has found only one example of this insect; though it is in very mutilated condition, having lost its antennæ, it apparently agrees with Walker's species described from Ceylon. It may be distinguished from all the rest of our *Anthribidæ* by the remarkably great dilatation of the third tarsal joint on all the feet.

Phlœobius gibbosus.

Phlœobius gibbosus, Roelofs, C. R. Ent. Belg., xxii., p. lv.

A small series of this species was found on *Rhus succedanea* near Nagasaki during Mr. Lewis' first visit to Japan.

Phlœobius mimes, n. sp.

P. gibbosi persimilis, minor, antennarum articulo ultimo in utroque sexu breviore; niger, fusco griseoque tomentosus, parum variegatus. Long. 6—7 mm.

Although this insect is only half the size of *P. variegatus*, the two are otherwise so similar that at first I

thought them to be of the same species. This, however, is, I believe, not the case; the club of the antennæ is comparatively short and broad in the male, the terminal joint not being elongate and bisinuate, as it is in *P. gibbosus*. In the female of *P. mines* the club is shorter, and the joints are bilaterally symmetrical, whereas in that sex of *P. gibbosus* the dilatation of the club joints is greater on the inner than it is on the outer side.

This species also was found during the first visit of Mr. Lewis to Japan in 1869 near Nagasaki.

Basitropis dispar, n. sp.

Elongatus, niger, subcylindricus, griseo-marmoratus, antennarum articulo ultimo ferrugineo; prothorace parce punctato. Long. rostro porrecto 11—12 mm.

Mas. Antennis crassis, articulis 4o—8m gradatim crassioribus.

Fem. Antennis clava quadriarticulata.

Rostrum very short, canaliculate on the middle; vertex sparingly punctate. Thorax elongate, nearly parallel-sided, except in front, where it is rather abruptly constricted, the surface much variegated by irregular olive-grey patches, and bearing numerous rather large shallow punctures. Legs stout, tibiæ broadly grey in the middle. In the female the eighth joint of the antenna is so much broader than the others that it may be considered to form part of the club. In the male the joints are thickened from the fourth outwards, so that it cannot be said where the club commences; each of the broader joints bears some dark pubescence on the anterior part of the lower surface; the third and fourth joints are quite short, the latter slightly the longer. In each sex the penultimate two joints are transverse, the terminal joint is also short, and is paler in colour than those preceding it.

Nikko; a small series found in the month of June.

The genus *Gynandrocerus* of Lacordaire can scarcely be maintained as distinct from *Basitropis*, as it appears to rest solely on a difference in the antennæ of the sexes. *B. dispar* belongs by this character strictly neither to *Basitropis* nor *Gynandrocerus*.

Ozotomerus japonicus, n. sp.

Elongatus, angustus, cylindricus, niger, griseo-subvariegatus, elytris post medium plaga, magna, indeterminata, nigro-fusca. Long. 7½ mm.

Antennæ extremely short, joints 2—8 slender, 6—8 quite minute; club compact, three-jointed, acuminate. Head destitute of rostral prolongation, grisescent. Thorax elongate, parallel, coloured like the head, not variegate, though the griseous pubescence does not cover it quite uniformly. Elytra long and narrow, grisescent, bearing numerous small indistinct fuscous black spots, and before the extremity a broad band of this colour, very vaguely limited in front, more sharply behind. Legs rather slender, tibiæ obscurely rufescent.

Nishi. A single specimen, probably of the female sex.

Caccorhinus, nov. gen.

Rostrum brevissimum, anterius subattenuatum. Antennæ breves, clava triarticulata sat elongata, articulo decimo transverso; oculi fortius granulati. Submentum brevissimum, anterius vix emarginatum.

This is a very distinct genus, and it is not easy to determine the exact position it should occupy in Lacordaire's system of the *Anthribidæ*, it being doubtful whether it should be placed near *Basitropis* or *Brachytarsus*, and by no means closely allied to either. The condition of the submentum—unique, so far as I know, in the family—renders it isolated. The rostrum is excessively short, but on the under side is divided from the head by a very deep constriction; the antennæ are inserted at the sides of the rostrum, the point of insertion is covered in front, the scrobes are grooves extending directly downwards; the whole of the basal joint of the antennæ is, however, exposed. The eyes are coarsely facetted, and very large. The submentum appears to be quite truncate, but a careful examination shows that its angles are slightly prolonged in front. The thoracic carina is quite basal, and is continued at the sides for about half the length of the thorax. The front coxæ are nearly contiguous, the middle rather widely separated, the mesosternum between them not quite perpendicular. For the present the genus will, I think, be best located between *Basitropis* and *Eugonus*.

Caccorhinus oculatus, n. sp.

Sat elongatus, subcylindricus, prothorace anterius attenuatus; niger supra griseo-tomentosus, nigro-maculatus. Long. 6½—9½ mm.

First and second joints of antenna much thicker than the following, but rather slender; third to eighth quite slender, ninth broad, subquadrate; tenth transverse, terminal joint as long as the two preceding together. Thorax rather long, greatly narrowed towards the front, not variegate, but the basal part usually darker in colour than the front part. The carina is quite basal, and forms a rectangle—very slightly acute—with the lateral margin. The elytra are rather elongate, and bear much griseous tomentum, in which numerous black spots are arranged in a linear manner. The under surface is black and destitute of tomentum.

This species was found in fungus at Osaka during Mr. Lewis' first visit to Japan. On his recent journey he met with it at Junsai, and at Otsu in July.

Brachytarsus niveovariegatus.

Brachytarsus niveovariegatus, Roel., C. R. Soc. Ent. Belg., xxii., p. lv.

Apparently a rare insect.

Brachytarsus fallax.

Brachytarsus fallax, Perris.*

A fair series of this insect was met with. They are all, with one exception, much larger than my unique European representative of the species; but I can find no satisfactory indication of specific distinctness.

Hitoyoshi, Kashiwagi, Nikko, Kurigahara, Junsai.

Arœocerus fasciculatus.

Arœocerus fasciculatus, DeGeer, Ins., v., p. 276, pl. 16, f. 2.

Amblycerus japonicus, Thunb., N. Act. Ups., vii., p. 122.

Arœocerus coffeæ (Fab.), Schönh., Gen. Curc., i., p. 172.

This species has no dilatation of the front tarsi in the male, but that sex may be identified by the apex of the dorsal plate of the pygidium being rounded, while it is acuminate in the female.

Mr. Lewis procured a few specimens of this insect during his first visit to Japan; they agree with examples from S. America in my own collection.

* I have not been able to find the description of this insect.—D. S.

Arœocerus tarsalis, n. sp.

Brevis, convexus, nigricans, antennis pedibusque rufis, his variegatis, illis clava nigricante; supra in thorace elytrisque setosulis variegatis, ornatus. Long. 3½ mm.

Mas. Tarsis anterioribus dilatatis.

This is closely allied to *A. fasciculatus*, but is of slightly shorter form, more prettily variegated above, with shorter prothorax and club of the antennæ, and with the male characters different. In this latter sex the front feet are notably larger than they are in the female, being both longer and broader; and in this sex the apex of the pygidium is rounded and ciliate, while in the female it is acuminate.

This species varies much in colour and size; some specimens are nearly black and very little variegate, except that the basal parts of the antennæ are constantly yellow.

A fair series was amassed, made up from several localities: one of them, a female, is labelled as having been found amongst peas at Kobé in August, 1871. Kiga, Miyanoshita, Nikko, Kashiwagi, Chiuzenji, Awomori, 22nd June, 1881, 23rd August, 1881. Kiga, Miyanoshita, Fuji, Nikko, Awomori.

Choragus compactus, n. sp.

Niger, densissime punctatus, opacus, antennis elongatis, articulis basalibus rufis pedibus piceis; elytris seriatim fortiter, regulariter punctatis. Long. 3½ mm.

Antennæ with the basal joint elongate and much curved, second about as long; club elongate, very loosely articulated and fragile. Head broad, eyes large. Thorax very densely finely rugulose, blackish, somewhat piceous in front, and with an excessively minute pubescence about the sides, giving it a silvery reflection in certain lights; the hind angles prolonged behind beneath the shoulders of the elytra: these latter with regular series of very coarse punctures, the interstices rather convex, very densely punctate. Legs stout.

This fine *Choragus* has, like the following species, the appearance of a small *Cryptocephalus*. Three examples were found at Nikko.

Choragus cryptocephalus, n. sp.

Nigerrimus, densisssime punctatus opacus, antennis, articulis basalibus fusco-testaceis; elytris seriatim fortiter punctatis, interstitiis primo et secundo pone basin irregularibus. Long. vix 3 mm.

This is smaller than *C. compactus*, and the angles of the thorax, though very acute and prolonged backwards under the shoulders of the elytra, do not form a definite process, as in *C. compactus :* also there is a peculiarity by which the species may be distinguished, there being near the base a kind of isthmus by which the third interstice appears to pass across the second to form a connection with the suture. The colour is jet black, and the sculpture of the thorax is not so rugulose as in *C. compactus*.

Nikko, two specimens; and from the same locality an individual which may be either a small variety, being only one-half the size, or a distinct species, more probably the latter.

Choragus mundulus, n. sp.

Sat elongatus, subcylindricus, fuscus, elytris pallidioribus, antennarum basi pedibusque testaceis, antennis extrorsum nigris; prothorace omnium densissime punctato; elytris regulariter profunde striatis, interstitiis convexis, striis crebrius punctatis. Long. $2\frac{1}{2}$ mm.

This is more cylindrical in form than the other Japanese *Choragi*, and is readily distinguished by its shape, and by the deep striation of the elytra from *C. compactus* and *C. cryptocephalus*, while from *C. anobioides* and the rest of the genus it differs by the fact that the base of the thorax has on each side a small piece produced under the shoulders of the elytra. The antennæ are elongate, with long excessively loosely-articulated club. The punctuation of the thorax is extremely dense, and the basal carina is a little angulate in the middle. The minute punctuation on the elytra does not render them quite dull.

25th July, 1881, 4th August, 1881. Three specimens.

Choragus anobioides, n. sp.

Minutus, brevis, niger, opacus, anteunarum basi pedibusque piceis; prothorace densissime ruguloso-punctato; elytris seriatim punctatis, interstitiis dense subtilissime punctatis haud omnino opacis. Long. $1\frac{3}{4}$ mm.

This is another species that has entirely lost the facies of an Anthribid; it may be distinguished from the preceding species by the hind angles of the thorax being rectangular and not produced, and by there being no trace of any isthmus on the elytra. In these respects it resembles the following species, *C. cissoides*, but that species has the elytra somewhat shining, the interstices being nearly impunctate.

Oyama, 1st June, 1881. Four examples.

Choragus cissoides, n. sp.

Minutus, brevis, niger, antennarum basi pedibusque rufis; prothorace densissime punctato, opaco; elytris seriatim fortiter punctatis, interstitiis subconvexis, obsolete punctatis, subnitidis. Long. $1\frac{1}{2}$ mm.

This little insect has more the aspect of a species of the genus *Cis* than of the normal *Anthribidæ*, and bears an excessively short minute pubescence, somewhat like that which is seen in some species of *Cis*. It is very closely allied to *C. anobioides*, though readily distinguished by the scanty and obsolete punctuation of the interstices. The pygidium is much covered by the elytra, and very coarsely punctate.

19th June, 1881. Two specimens. There is also a mutilated example from Nagasaki, which is still smaller and more shining, and may possibly be a variety, though I think it more probably distinct.

Choragus cryphaloides, n. sp.

Brevis, minutus, rufo-testaceus, elytris abdomineque fuscis, antennarum clava nigricante; prothorace brevi, densissime rugoso-punctato; elytris seriatim fortiter punctatis, interstitiis convexis, sat dense punctatis, subnitidis. Long. 2 mm.

The bright red colour of the anterior parts of the body distinguishes this species; the hind angles of the thorax are rectangular, and not produced under the shoulders

of the elytra. The punctures forming the series on the wing-cases are large and distinct, and the minute pubescence is quite evident. In the male the ventral segments are short, and the basal three or four are broadly impressed on the middle.

Nikko; Kurigahara, 6th August, 1881. Four specimens.

Deropygus, n. gen.

Inter *Arœocerum* et *Choragum* locandus; discedit antennis inter sese parum distantibus, coxisque intermediis approximatis.

There can be no question as to the position of this genus, for its characters are almost those of *Choragus*, except as to the two points mentioned above. The eyes are round and convex, however, and formed more like those of *Arœocerus;* the antennæ are slender, with large excessively fragile club, and the inner margin of their cavities of insertion extends considerably farther inwards than the inner edge of the eye does. The thoracic carina is basal, and is continued along the sides for about half of the length. The mesosternum forms a small subrhomboidal piece in front of the middle coxæ, and is connected with the metasternal process only by a narrow isthmus. The pygidium is remarkably slender, and projects somewhat downwards in a beak-like manner.

Deropygus histrio.

Fusco-niger, subopacus, subtiliter tomentosus, superne albido-picturatus antennarum basi pedibusque testaceis. Long. 3 mm.

Antennæ with an elongate setose club, which is dark in colour, formed by three excessively slightly articulated joints, the first of which is a little the larger. Head and rostrum inflexed. Thorax rather short, extremely densely and indistinctly sculptured, quite dull, dark in colour, with three white spots along the front, three along the base, and one on each side. There are series of rather large punctures on the elytra; these, however, are rendered indistinct by the clothing: this is very fine, dark in colour, but variegated by numerous white spots. The front legs are sordid testaceous, the hind pair are more dusky in colour.

Ichiuchi, 1st May, 1881. Two specimens.

Deropygus jocosus.

Fusco-niger, superne, vage griseo-picturatus, capite prothoraceque rufescentibus pronoto basi late in medio nigricante, antennarum basi pedibusque rufis. Long. 3 mm.

Antennæ with the first and second joints red, stout, the following joints blackish, extremely slender; club large, extremely loosely articulated. Thorax red, with the base in the middle broadly blackish, extremely densely punctate, very sparingly pubescent; the hind angles produced beneath the shoulders of the elytra in the form of a definite lamina. Elytra with series of very coarse punctures, separated by narrow interstices, the sculpture somewhat concealed by the pubescence, some of which is greyish, the most conspicuous being a flammulate fascia behind the middle. Male with the pygidium inflexed, very elongate, suboblong, the ventral segments much abbreviate in the middle, the metasternum impressed and tuberculate on each side.

Only one example has been found of this very interesting insect; at Fukushima, 28th July, 1881.

NOTIOXENUS.

This genus has hitherto only been recognised as found in St. Helena, where it possesses numerous species, and forms one of the most remarkable elements of the coleopterous fauna. The St. Helena species of the genus differ considerably in some structural points, such as the coarseness of the facets of the eyes, and the width of the intercoxal process of the abdomen. As long as they remain in one genus, the two Japanese species I here describe must also be placed in it, and likewise the New Zealand *Anthribus inflatus*, Sharp. So that this genus, hitherto considered peculiar to St. Helena, is now found to exist in three most widely separated parts of the world. If the St. Helena genus were to be divided,—and this will probably be found necessary when the classification of the family is remodelled,—then the two Japanese species would form two distinct genera, and the New Zealand species another. *Arœocerus purpureus*, Brown, should form also a new genus between *Notioxenus* and *Homœodera*.

Notioxenus wollastoni, n. sp.

Elongatus, angustulus, fuscus, tomentosus, indistincte griseo-variegatus, antennarum basi, pedibusque rufis. Long. $2\frac{7}{8}$ mm.

Antennæ with the basal joint stout, elongate, curvate; second joint shorter, but equally stout; club very elongate. Thorax large, the base curvate, the hind angles slightly marked, remote from the elytra, the surface very densely but indistinctly sculptured, very indistinctly variegate by some scanty pallid pubescence. Elytra narrow, with rounded shoulders and series of deep coarse punctures, separated by very narrow interstices, scantily pubescent, and indistinctly spotted by scanty pallid hairs.

Higo. Three specimens in bad preservation.

Notioxenus tomicoides, n. sp.

Rufulus, supra æneus, nitidus, antennis basi pedibusque testaceis, illarum clava fuscescente; prothorace elongato, elytris brevibus. Long. vix. 1½ mm.

Antennæ with short comparatively compact club, the intermediate joint of which is transverse. Eyes finely facetted. Pronotum very elongate, sternum short, so that the thoracic orifice looks downwards, as in many *Tomicidæ;* surface finely punctured, shining, the hind angles slightly marked, much removed from the elytra; the latter short, shining, covered with series of closely-placed punctures, and with a few minute punctures on the small interstices.

This is the smallest Anthribid discovered, except *A. atomus*, Sharp. It greatly resembles *A. inflatus*, Shp., from New Zealand, but that species has coarsely facetted eyes, and the ante-coxal portion of the prosternum no longer than the post-coxal portion.

Togami, near Nagasaki. A small series of specimens.

XII. *The life-history of the Hessian Fly*, Cecidomyia destructor, *Say*. By Frederick Enock, F.E.S.

[Read February 4th, 1891.]

Plate XVI.

In the 'Third Report of the United States Entomological Commission, 1882,' there is a long paper compiled by Dr. A. S. Packard, on the Hessian Fly, concluding with a list of no less than seventy-one papers and articles on this insect; and since that date the number has gone on increasing, so that up to the present time it cannot be far short of one hundred! This being so, anyone would naturally suppose that the subject had been thoroughly worked out, with every detail of the life-history laid bare, until nothing more could be learned about it; and I dare say that many may think it presumptuous on my part to attempt to say anything new. My reason for bringing this matter before you is—that of all those who have written upon the Hessian Fly, since Mr. George Palmer, of Revell's Hall Farm, Hertford, first discovered it in England, on July 27th, 1886, none of them have given any account of its life-history from their *own* observations, but have preferred to copy the writings of others, and, in so doing, have copied their mistakes.

Before entering upon a detailed account of the notes and observations which I have made during the past four years, I will throw upon the screen a photograph of a barley plant, taken from a field at Revell's Hall Farm, in which you will observe that the stem is bent down sharply at the second joint; this has been caused by the larvæ of the Hessian Fly (*Cecidomyia destructor*, Say), and it was this appearance of bent and broken stems which first attracted the attention of Mr. Palmer, who at first thought the barley was merely "root-fallen"; but a more careful examination of the bent stems revealed the peculiar chestnut-coloured "flax-seeds" which Prof. Westwood and others identified as the puparia of the Hessian Fly.

Most of us here present will remember the fear and great trembling which seemed to fall upon some entomologists, farmers, and others; and "reports" came in from various quarters, all kinds of ingenious explanations being given as to why it had appeared in one county and not in another—the fact that "the pest" had wings and could transport itself whithersoever it felt disposed being quite overlooked; and I am inclined to think that had we had in Great Britain a properly organised staff of practical entomologists, with agents in the country, such as the United States of America have, our Government "Reports" would now be looked upon with a little more respect than they are by foreign entomologists.

It is very often the case, when an entomologist sets himself the task of following out the life-history of any particular insect, that he becomes acquainted with its *last* stage *first*, and the *first*, *last*; though the subject of my discourse made itself known to us first in its so-called puparia or third stage, and this appears to have satisfied most "arm-chair" naturalists.

My first acquaintance in the field with the now well-known "flax-seed" was made on August 5th, 1887, when invited by Mr. G. Palmer to visit his barley fields, and many times since then have I enjoyed the kind hospitality of Revell's Hall.

I will now commence the life-history of the Hessian Fly by giving my notes and observations made upon the *first* stage, *viz.*, the egg. On Sept. 8th, 1888, I visited Revell's Hall Farm, and examined the stubbles in one of the barley fields, which had only been cut a day or two previously, and here I very soon found the eggs on both self-sown plants and aftergrowth. I immediately settled down to serious work, and, whilst so engaged, I observed a small dark fly meandering about the stubble close to the ground; after following it for some yards I lost sight of it near some aftergrowth, from which I started it up again, and finally lost it among a heap of cut barley. On examination of the self-sown plants I found a number of eggs had been laid thereon.

Wishing to arrive at some definite conclusion as to whether the fly preferred the self-sown plant or the "aftergrowth," I gathered a hundred of each. I then most carefully examined each leaf on both sides with my pocket-lens, commencing with the self-sown, most of

which had but *one* blade, or at the most *three*, varying in length from an inch and a half to three inches high, showing that they were of very recent growth. I found eggs on 21 of them, *all* laid on the youngest or last developed leaf; these I subjected to a more minute examination on reaching home; the total number of eggs being 113, or an average of 5 to each self-sown plant, the actual numbers varying from 2 up to 12 on a leaf. Of the 100 plants of "aftergrowth," most of them 6 to 9 in. high, and having 4 to 6 leaves, only 12 had been attacked; the number of eggs laid was 84, or an average of 7 to each plant, showing the marvellous instinct (or whatever else we may term it) of the fly, which, in the case of the delicate self-sown plant, only laid 5 to each, but seem to know that the stronger *aftergrowth* was capable of sustaining more; the number of eggs laid varied from 2 to 20. On 9 these were laid on the last developed leaf, and on the other 3 the eggs were divided, and laid on the last and preceding leaf: leading me to think that *two* flies had visited these three plants. Most of these eggs hatched in less than a week.

On Sept. 22nd, 1888, I found great numbers of eggs on both self-sown and aftergrowth barley around Stroud, Gloucestershire, where I also found puparia in the stubble, and great numbers in the wheat; in fact, in *every* barley and wheat field which I examined around Stroud during a fortnight's visit to Mr. Thos. Lancaster, of Bownham House, I found eggs and puparia in the greatest abundance, besides capturing a number of specimens of the male Hessian Fly on the windows. This is the first time "the pest" had been reported from the West of England, though no doubt it had been firmly established there, as I am inclined to think it has been all over the country, for some time; and if farmers could be persuaded to search for it, I think it would be found all over England and Scotland, and in all probability in Ireland too.

As it would be impossible from *out*-door observations to determine the number of eggs a female fly is capable of laying, we must fall back upon experiments conducted somewhat under difficulties and artificial circumstances, owing to the surroundings of a small London garden not being quite so countrified as we could wish.

From puparia which I collected on Aug. 5th and 8th, 1887, I bred a large number of male and female flies,

and on June 4th, 1888, I placed an impregnated female under a separate cylinder of book-muslin, a foot high by 6 in. in diameter, carefully fitted and fixed over a flower-pot containing a dozen young plants of barley of four days' growth; in a few moments after being introduced, the female settled on one of the plants about 2 in. high, and commenced ovipositing as fast as she could: by first placing three eggs side by side, then at a short distance three more close together, then six on the outside of the sheath of the stem, and, apparently becoming excited, she laid clusters of three, four, and six; seven more on the outside, and five at the tip of the leaf: thirty-seven in all on this one plant; she then flew to No. 2, laying

16 on the inside of the leaf, and 10 on the stem	.	= 26
No. 3. 4 outside, and 11 on the inside of leaf	. .	= 15
,, 4. 24 on the inside of leaf, some in clusters	.	= 24
,, 5. 10 ,, ,, ,,	.	= 10
,, 6. 6 outside sheath, close together, & 12 inside.		= 18
,, 7. 14 ,, ,, ,, 14 ,,	.	= 28
Total	.	158

eggs laid by this one female, which is greatly above the number stated by most writers, Herr Wagner included; he gives the number at 80 and under 100.*

On July 29th, 1888, I isolated another female immediately after impregnation at 2 p.m., when she commenced to oviposit on the barley plants, continuing to do so until 7 p.m.; on examination of the leaves, I found she had laid 23 eggs on the outside of 12 leaves, and 106 on the *inside* of 27 leaves; total, 129. The next day the fly appeared to be laying eggs on the muslin, but I could not get my lens near enough to detect them.

Aug. 3rd, 1888. I put six females under a cylinder, but, as I went to Hertford that day, I had not an opportunity of watching them or examining the leaves until the following day, when I found 38 eggs had been laid on the *outside* of 10 leaves, and 228 on the inside of 21 leaves, varying in number from 1 to as many as 44 on a single leaf. These females did not appear to have completed ovipositing, and for some reason would not continue.

* 'U. S. A. Third Report.' Appendix, p. 15.

On Aug. 5th, one female laid 80 eggs on one leaf 2 in. long, and another 100 in a small phial.

Aug. 6th, a female laid 58, and another 140 eggs.

On the same date I placed six impregnated females in separate phials, where each one commenced to oviposit freely, placing the greatest number on the under side of the corks. No. 1 laid 130; No. 2, 125; No. 3, 129; No. 4, 114; No. 5, 96; and No. 6, 70 eggs.

I will not weary you with further details of oviposition, as those I have given show that the female Hessian Fly lays from 100 to 150 eggs, distributing them over many plants, and depositing them end to end in rows of 3 to 10, sometimes side by side, and at others carelessly in clusters.

On Sept. 13th, 1888, I dug up a fresh root of wild oat-grass (*Arrhenatherum avenaceum*), and re-set it in a pot of sandy soil, covering it over with a cylinder of book-muslin; I then introduced some female flies, and one soon settled down to ovipositing on the upper surface of the leaves; but I noticed a peculiar uneasy movement of the ovipositor, as though the fly was not quite satisfied that it was a suitable plant; and when some fresh *barley* leaves were introduced, she immediately recognised their presence, becoming quite excited and utterly careless in her hurry to lay her eggs, most of which were in clusters or, I might say, lumps. On Oct. 14th I made a careful examination of the grass, but could not find any trace of larvæ, so concluded the stem was too hard and dry for them to subsist on. Prof. C. Lindeman, of Moscow, has found the puparia on Timothy-grass (*Phleum pratense*).

I have made most careful microscopic measurements of the fresh-laid egg, which is ·02 mm. long by ·008 broad; it is rounded at both ends, of a pale orange colour, with reddish dots here and there, making it very easy to be seen in the ridges of the young barley-leaves; this colour soon changes to a somewhat darker hue, the shell becoming so transparent on the third day that the movements of the enclosed larvæ can be distinctly seen; and on the fourth day I have often watched them making muscular efforts to burst open the shell, which they succeed in doing after three or four hours' work.

The female fly, as a rule, lays her eggs with the head-end pointing downwards towards the main stem, so that when the tiny larva emerges it is started from its infancy

in the right direction on its journey downwards, and, guided by the longitudinal striæ of the leaves, it reaches the stem, round which the leaf-sheath is closely wrapped, but not too close to prevent the larva forcing its way; until, after some four hours' steady travelling (during which time it has covered only the small distance of two or three inches), it reaches the base of the sheath, generally of the second joint above ground; here its further progress is blocked, and it turns half round, so that its ventral surface is in contact with the stem, the head still downwards.

As idleness in insects is a characteristic noticeable by its absence, the tiny larva commences to injure the plant by bringing its head and mouth up to the soft stem, imbibing the life-juice for its maintenance, but very much to the detriment of the barley. The larva increases in width even before it disappears out of sight, leading one to suppose that it imbibes moisture as it journeys down the furrows of the leaf; that the larva *is* capable of taking fluid nourishment I have proved by feeding and fattening a number of them which emerged in a glass phial, Aug. 7th, 1888, into which, attached to the cork, I put a strip of white blotting-paper, which I had moistened by dipping into a very weak solution of starch-water; the damp paper clung to the sides of the phial, and between the paper and glass a number of the young larvæ crawled, and lived upon the starch-water for more than a week. I am afraid, when withdrawing the cork to replenish the blotting-paper with starch-water, the larvæ received some injury, for all were dead on the eighth day. I frequently observed that when an impregnated female was put under a cylinder enclosing growing barley she showed considerable excitement, and was careless as to where she laid her eggs; sometimes settling on a leaf bent down, laying her eggs the *wrong* way, with the heads towards the *tip* of the leaf.

I watched the eggs very closely on the fourth day, and was fortunate in seeing some hatch. The larvæ worked their way to the tip of the leaf, where some of them managed to cross the edge and get on to the back or under side, and commenced their tremendous journey of four to six inches! some arriving at their destination at the next joint *below* the one they would have occupied had the female laid her eggs on the inside of the upright

leaf. The progress of the young larvæ was very much accelerated when the leaf was moistened, and many died on a hot, dry day.

Some of the "one-day-old larvæ" I mounted in fluid, and the one now before you shows the head and organs of the mouth as seen from above, and the other seen from the side (Plate XVI., fig. 1). From these you will observe that the mouth of the *young* larva appears to consist of a notched semicircular plate, at each side of which are the palpi. At the anal end there are indications of suckers, or prehensile feet.

Larvæ measured Aug. 9th, bred Aug. 7th, were 2 mm. long. On Aug. 23rd I examined some of the young barley plants growing in pots, upon which a number of eggs were laid Aug. 8th: at one joint I found three larvæ, and at the second joint of another no less than nineteen of various sizes, packed close together.

On Aug. 8th eggs were laid by a female, and hatched on the 12th; the larvæ full grown Sept. 6th, when I noticed some were beginning to change colour; this gives 25 days as the feeding-time of these larvæ in confinement.

A good deal has been written about the so-called "anchor-process," or "breast-bone," which is (according to Miss Ormerod):—"A short stem fixed at one end to the larva, and free at the other; the free end, which points forward, is considerably enlarged, and is of various forms . . . . . but the use of this appendage does not appear as yet to be fully known; but from my own observations I conjectured that it is used as a digger or scraper, and it may be that the reason why strong-stemmed wheat, or stems containing more silica, are not so much injured by attack as other kinds is that the fork is not strong enough, in these instances, to assist the excessively delicate mouth-parts to acquire their food from the stem."

And again, in our *one* "Official Report," which was "presented to both Houses of Parliament by command of Her Majesty"! we read, at p. 12:– "From the eggs laid in the spring comes a wrinkled yellowish maggot, the larva, without legs, having fourteen joints. It is close upon the eighth of an inch in length when full-grown, being then of a clouded white hue, and showing faint greenish lines under the skin. The

anchor-process, or breast-bone, upon the second segment next to the head, on the under surface of the body, is also plain and prominent. This is a forked appendage, mistaken by Curtis for two rudimentary legs, and is peculiar to the larvæ of the *Cecidomyiæ*. It is probably used to assist the larva, whose mouth is soft, in penetrating the tissues of stems of corn-plants. After the larva has been hatched, it proceeds from its birth-place on the leaf above almost invariably to the second joint of the stem at the base of the blade or leaf, and fixes itself head downwards, with its head close to the soft stem, and with its rudimentary mouth, *and its anchor-process* (italics are mine), as is supposed, absorbs the juices of the plant."*

To most of those who have read the two pamphlets from which I quote the above, these statements may appear perfectly correct; but anyone who will take the trouble to carefully examine under the microscope the *true* larva (Plate XVI., figs. 2 & 3), (by this I mean the larva in its first or *feeding* stage) will at once see that it does not possess any anchor-process at all, and it is not until the *final* larval stage, when the larva is securely sealed up within the puparium or coarctate larva, or second larva stage, that the anchor-process is developed and utilised in the most wonderful manner.

I will now throw upon the screen a photograph of a feeding larva, showing the invaginated head (Plate XVI., fig. 3), and would call your especial attention to this wonderful provision of Nature, the mouth being so constructed that it acts like a spiral spring; and whatever the pressure of the leaf-sheath upon the dorsal surface, the mouth is kept just up to its work, and adapts itself to the varying pressure—another example of the skill of the Great Artificer, which cannot fail to excite our admiration and wonder.

On Aug. 15th I collected a number of coarctate larvæ, as well as some larvæ still feeding in the aftergrowth, or any green plants; these I carefully examined, as well as the nineteen found at one joint, for the purpose of deciding to my own satisfaction which way the larvæ rested; for all writers in America and elsewhere state that the larva rests head downwards, and yet not one of the number has ever explained how the fly emerges.

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* See 'Whitehead's Report,' p. 12.

Perhaps it will not be waste of time to consider the position of the larva when feeding. The head and mouth-organs of a new-born larva are, as you will see from the photograph, placed at the extreme end; but if we examine a full-grown larva, we find the head has become invaginated and bent round almost at right angles to the body, so as to bring the mouth-organs into contact with the stalk of the plant, and as the juices are imbibed the cells become partially withered, forming a cavity in the stalk, in which the larva is embedded, or pressed into, by the encircling leaf-sheath.

I must confess that when I read that the larva fixes itself head *downwards*, I felt rather incredulous, for I immediately thought, if this be so, How does the *fly* emerge? for, as you see from the photograph (Plate XVI., fig. 9), the head of the larva is *downwards* and turned *inwards*, fixed into the solid stem; and, even supposing that the pupa was capable of penetrating this, it would only land itself in the centre of the hollow stem, with a solid joint top and bottom to bar further progress. I then thought that surely the larva must, as soon as it reaches the joint, immediately reverse its position, keeping its head *up*, and then there would be no impediment in the way of the fly when emerging. I examined a number of half-grown larvæ most carefully, and could not then come to any other conclusion but that they had been wrongly described as having their heads downwards, and this idea was considerably strengthened when I bred several of the flies, for on examination of the puparia I found they *had* emerged at the top end

On Sept. 6th, 1888, I examined some of the home-grown barley plants, and found six larvæ at one joint; one of them was full grown, the colour glassy-white, with the usual greenish intestine, the skin perfectly tight, so that the segments were scarcely visible. I laid this specimen on its back for the purpose of making an exact drawing, and, whilst engaged measuring the lower or thick end with the eye-piece micrometer, I was astonished to see through the skin, immediately below the orifice (which I had imagined was the tail), the anchor-process in motion. This discovery—to use a somewhat unscientific expression—"sent my heart into my mouth," for I had a strange feeling that I was on the point of clearing up a great difficulty; for as this apparatus, the

anchor-process, is placed in close proximity to the head of the larva in the *third* stage (Plate XVI., fig. 5), and the fly emerges at the top end, it proved that the larva in its *third* stage *turns head to tail within the puparium*, and its head, which when feeding was pressed against the stem, is now brought to the opposite side and end, facing outwards and upwards (Plate XVI., figs. 9 to 16). At the time of this discovery I made a note that it seemed to me that the anchor-process was in some way used by the larva to assist it in turning round.

On the following day, Sept. 7th, 1888, I examined a number of barley plants, removing therefrom all the full-grown larvæ, of which there were great numbers, and in most of these I could see the anchor-process under the invaginated head, fully confirming the previous day's discovery; these larvæ gradually assumed the coarctate state, and in a fortnight had become of a chestnut colour; these and many others taken from the barley plants I fixed to a piece of card in the same position as they occupied when feeding—with heads *downwards*.

On Sept. 7th I also dissected seven puparia collected since July 5th, and in one case the anchor-process was found at the upper end, proving beyond a doubt that the larva had turned round. Another which I dissected revealed the *true* pupa, with its head up and facing outwards; the perfect insect emerged in about ten days after, and the other six a little later.

Of the puparia fixed on card, I opened one or two at regular intervals of about a week to see if I could catch a larva in the act of turning round. The first examined, Sept. 13th, had the anchor-process still at the lower end, and subsequent examinations made all through the winter and up to April 5th, 1889, showed the anchor-process to be still at the lower end; but on April 20th I examined some, and found no sign of anchor-process at the lower end, so dissected the *other* end, and, on removing the skin, discovered that the larva had turned round, the anchor-process now being seen at the top end outwards; and *all* examined after this date, April 20th, had turned round, and during May many were found to have changed to pupæ. From the foregoing observations I gather that when the larva arrives at full growth and leaves off feeding, and coincident with the gradual hardening of the skin and change of colour from white to chestnut-brown, is the wonderful change *within* the

coarctate larva. Careful dissections and removal of the outer skin reveals the larva in its final larval stage; the smooth shuttle-shape remains, but has no connexion with the enclosed larva, which has shrunk away from its former covering, *just as a ripe nut does from its shell*, and is now somewhat flattened and much wrinkled in form, with blunt ends; the head, which in the *feeding* larva was decidedly turned so that it was on the side, has now recovered its primary position at the end, and immediately below this, in front, on the second segment, is the anchor-process, a photograph of which I will now throw upon the screen (Plate XVI., fig. 6). From this front view you will observe that the fixed part of the apparatus lies partially embedded, the tips just projecting beyond the top of the segment.

Though my endeavours to catch a larva in the act of turning round were not successful, I made some valuable observations from the contortions of the disturbed larvæ, the most important being that, by a powerful contraction of the muscles attached to the lower part of the anchor-process, the larva was enabled to draw the apparatus in at the base until it was at right angles to the normal position; the head, too, was drawn *quite* in, so that the forked end of the anchor-process projected to its fullest extent, and whilst in this naked condition it is thrust into the inside walls of the coarctate larva; the muscles are relaxed, and the ventral surface brought into contact with the inside ventral surface of the coarctate larva. Then other muscles appear to move a portion of the dorsal surface of the body downwards and round towards the bottom or head-end of the coarctate larva; the tips are then withdrawn, the base contracted again, and a hold taken by the tips being driven in a little higher up; again the muscles bring a tiny portion of the body further round and down, and so this leverage goes on until the larva has completed its task, reversed its position, and rests with its head *up* and anchor-process *outwards;* the spines on the skin of the larva, all of which point down towards the base, assist it materially in obtaining a firm hold on the inside of the coarctate larva, preventing it from slipping back.

On July 31st, 1889, I received from Mr. Stewart a number of pieces of the common reed grass (*Digraphis arundinacea*); on the outside of the stems

were a number of longitudinal slits of about $\frac{1}{8}$ in. long; on cutting the stem through, I found at the back of each of these slits a hard sort of internal gall, containing a flattened and wrinkled larva very much like that of the Hessian Fly, only twice as large; the anchor-process was very prominent; its movements exactly similar to those noticed in *C. destructor*. Having obtained a large supply, I endeavoured to cut the outer wall of the gall so that I could watch the movements of the larva, and at last, after endless failures, I succeeded in just cutting through and removing sufficient of one side to expose the larva; this I placed on the stage of my microscope in such a position that I could, with the aid of the "silverside-reflector," throw a most brilliant light into the interior. When first exposed, the larva was lying perfectly quiet in a horizontal position, but after some hours' watching, it slowly raised its head, then withdrew it out of sight; the tips of the anchor-process were brought into contact with the inner surface of the cell, followed by a movement and contraction of the base, exactly similar to that which I had observed in the larva of the Hessian Fly; it then appeared to fix the tips into the cell; the base of the apparatus appeared again, and the 3rd and 4th segments could be seen moving in the direction of the head; a slight pause, then the anchor-tips were next withdrawn the merest distance, and advanced very slowly; the muscular contraction repeated, and the points driven in, followed by a decided movement of the 3rd and 4th dorsal segments; these movements were continued until the larva had worked itself a little beyond right-angles, when it paused in its work, and gave me the opportunity for making a careful sketch; and though I watched it long into the night, it did not increase its position; possibly the aperture I had made had in some way interfered with its comfort, and it objected to be stared at with so high a power as 40 diameters! But I think I had observed enough to warrant me feeling sure that I had determined the use of this anchor-process, which at first sight appears of little importance, but when carefully and patiently studied proves to be of the highest importance, enabling the larva to extricate itself from a position which to me seemed incomprehensible.

I have bred a great many flies from the puparia which Mr. Palmer has so frequently sent to me, and most of them emerged from the dorsal side between the 10th

and 12th segments, but some had emerged at the other end; these I carefully examined, and found that the fly had emerged on the ventral side, or that nearest to the stem, showing that in these instances the larva had *not* turned round, and it would in all probability have perished had not the puparium become detached from the surrounding sheath. A few had emerged at the dorsal side, appearing to have revolved half-way round, so bringing the head to the front and outwards, though *downwards;* but in *every* one of the hundreds bred from coarctate larvæ in their normal position in the straw, the fly had emerged at the *top* end.

On July 5th, 1888, the larvæ were most plentiful in the barley, and as the crop was very backward and stunted in *May*, when the females were ovipositing, the larvæ in nearly every one of the 400 straws cut were not more than an inch above ground, and in many instances the barley was bent *at* the ground-line.

I noticed that the small thin plants were more frequently attacked than the stronger ones, and generally contained several larvæ; the tail-end protruding from between the folds of the leaf-sheath. The position of the larva was quite different to that in the 1887 crop, when the barley was much stronger and the bend nearly always at the second joint, and often at the third, 7 to 10 in. above ground.

The larva is most delicate, and dries up if the straw is cut before the maggot has reached its full growth; so that the only plan to observe the changes is to have a number of living plants of various sizes; in fact, when the flies are emerging, sow about a dozen grains in a six-inch pot, always keeping up a constant supply.

The second stage of the larva, known as the puparium, or, more correctly, the coarctate larva, and more popularly as the "flax-seed" state, has been so frequently and fully described that I need not add to it; but one thing I have constantly noticed is that when the leaf-sheath is removed carefully, and the upper or tail-end of the flax-seed drawn away from the stem, the mouth always appears to be fastened by some sort of white cement or starch, which in a measure prevents the puparium from being too readily shaken out of place before its time; though no doubt vast numbers are scattered broadcast when the harvest is cut and carried, and, wherever the

waggon goes, there the puparia are shaken out, and I have found them lying free on the ground underneath the shocks of barley.

The number of larvæ at the joints varies considerably —from one to nine in straw collected at Hertford, and in home-grown plants, in *one* instance only, as many as *nineteen!*

The male puparium is of a much more slender form and paler colour than that of the female.

When the crop of barley is backward, as in 1888, a great many puparia are left in the stubble, and should the field be sown with clover, they remain in the stubble all the winter, secure from injury; the flies which emerge after the harvest have no difficulty in finding plenty of aftergrowth and self-sown plants growing among the clover, and on which they lay their eggs.

Owing to the time of year when the wheat and barley are sown, the females are all dead before the wheat is up; but not so in America, where whole districts of "fall-wheat" are entirely ruined.

On Dec. 31st, 1888, I received from America a tin box which contained a large number of plants of this "fall-wheat," a very slight examination of which revealed a number of puparia close round the base of the stem, and in some cases there was a slight appearance of a gall-like swelling. I put these plants under a cylinder of muslin, and exposed them to the full force of the weather. From May 5th to the 22nd I bred forty-four male and thirty-seven female Hessian Flies, and from June 5th to July 5th twenty-three parasites, *Platygaster minutus*.

Herr Wagner, in his admirable Monograph on the Hessian Fly (a translation of which appears in the Appendix to the 'Third Report of the U. S. A. Entomological Commission'), states that:—"Though the great frequency of the parasites in the summer generation was striking, it was not less so that the pupæ gathered from the barley aftergrowth yielded not a single parasite, from which I infer an entire exemption of the actual winter generation (not to be mistaken for those hybernating in stubble) from parasites. Fitch received from young infested plants gathered in April only gall-gnats, thus corroborating my idea that the parasites attack only the winter generation."

I venture to think that Herr Wagner did not obtain a sufficiently large number of plants, or he would no doubt

have bred the minute parasite, *Platygaster minutus*, which, by the bye, can force its way through the meshes of the finest book-muslin, and only a cambric pocket-handkerchief tied over the cylinder will keep them in.

In the table given later on of the parasites bred, you will notice how very few emerge in September and October, and I think that one reason why the "fall-wheat" is so free from parasites is that they could not get down to the puparia, which are close to the roots; but I have repeatedly watched these small *Platygaster minutus* searching for and sounding the lower part of the stems for puparia, and, failing to find them, they have worked their way down the smallest space between the stem and surrounding earth, and no doubt reached the objects of their search.

The plants of "fall-wheat" sent from America were so dried up and brittle that when I attempted to search for puparia their position could not be accurately noted; but in infested plants of a similar size grown in pots, and on which the eggs were laid before a stem was formed, I found the puparia at the roots, and in some instances lying in the old husk of the grain, and others actually underneath the crown among the roots. The photograph of American "fall-wheat" shows the empty pupæ-cases protruding from the stems.

In only *one* instance have I found puparia at both 2nd and 3rd joints of the same plant, at Stroud, Oct., 1888. From about 500 infested straws gathered, I noticed a great many puparia were at the 3rd joint, at least nine inches from the ground, and that the barley at each side of the roadway through the fields was always most affected; this, to my mind, was the result of the previous year's scattering of puparia from the waggons at the time of carrying. I particularly noticed this at Hertford, Littlehampton, and many fields around Stroud, Gloucestershire.

The next stage is the third larval, or rather final larval, form, which is most easily obtained by placing on damp blotting-paper or sand a number of puparia picked out from "screenings"; these are more or less injured by having passed through the thresher, and the effect of moisture upon a fractured puparium is most striking, causing the larva to work its way out, and, when entirely free, it quietly rests in some cranny or under the surrounding puparia; and it is whilst they are in this state

that careful observations can be made of the anchor-process, &c., for attempts to dissect them from the puparia entail a great loss of time, and not unfrequently of temper also!

Mr. G. Palmer has after each harvest sent to me a sack of screenings, from which I have picked great numbers of puparia, and from these the larvæ in their final stage have crawled, most of them to a quiet corner, to lie dormant until April or May, when they change to pupæ; but a few change very quickly, and the flies emerge in September.

On May 12th, 1888, I picked out about thirty puparia from the 1887 harvest, placing them on white blotting-paper over damp sand; five hours after a larva was working its way out, followed by others in an hour or two, and several more the following day (the 13th). One of these began to alter in shape, the body *elongating*, losing the wrinkled appearance, until it had, on the 14th, at 6 a.m., almost regained its full-fed larval form; the skin being quite tight, the mouth-organs drawn down from the end to a ventral position, and all so tight and stretched that it looked like bursting; when at 3 p.m. I placed it under the microscope to make a sketch of it. Between 8 and 9 p.m. it began twisting and straining, particularly its head, which was moved backwards and forwards, until at last, at 9.30 p.m., the skin split over the mouth and towards the thorax; this effort was followed by a short rest, then more twisting, until the larva-skin, with its anchor-process, was gradually worked down the abdomen, and it rested a shrivelled mass around the anal segments, revealing the *true pupa*, which at first was perfectly white, with the exception of a brown chitinous projection not unlike a parrot's beak, occupying the place of the cast-off "anchor-process." No limbs or segments were visible until twelve hours after, when it began to assume a most delicate pink colour; the sutures of the head and thorax appeared but very indistinctly. Three days after, May 17th, the pink colour was decidedly darker, bringing into view the wings and leg-cases. Fourth day: the pupa quite rosy, the thorax testaceous. Fifth day: I made careful drawings under the microscope of the pupa in various positions, when *all* the parts were very distinct. These changes went gradually on, and on the eighth day the facets in the eyes became visible, and dorsal plates darker.

On the ninth day the eyes were much darker, and the tips of the feet or claws visible, and the second pair of legs traced under the wings; thorax much darker, inclined to brown.

The next day, wings almost black, and thorax very dark colour, but the eyes were not distinguishable from the other parts. In the evening, when I examined the pupa with side illumination, I could see the hairs on the abdomen, and mark the strong pulsations; the abdomen was much swollen, and the legs projected and stood clean away from the ventral surface.

At eleven days old the dorsal and ventral markings clearly seen, the ventral segments of a blood-red colour, with scales on back very plain and dark; at night, when examining this and other pupæ, I noticed that they were very susceptible to the light from the side reflector, all twisting and twirling about directly it was concentrated upon them. At 9 p.m. the skin of the abdomen appeared silvery, as though the internal moisture was absorbed.

On the twelfth day, at 5 a.m., the pupa was quiet, with the exception of a slight quivering of the tail; but on the following day, at 4 a.m., it commenced writhing about for a quarter of an hour, then a rest, followed at 4.45 by tremendous muscular efforts, and at last it succeeded in bursting its shell, the female fly gradually working its way out. From the number of larvæ I have watched change to pupæ, and then on until the flies emerged, I find the time varies from twelve to thirteen days for both sexes. One peculiarity I noted was the *time* at which the larvæ changed to pupæ—in nearly every instance between 9 p.m. and 3 a.m.

On August 3rd, 1888, I bred a male Hessian Fly from eggs laid June 2nd, giving sixty-three days for the entire transformation.

For the sake of convenience, I placed a certain number of free puparia in flower-pots filled up to within three-quarters of an inch of the top with damp sand, covered with white blotting-paper. On this I laid the puparia in rows, examining them every morning to see at what time the flies emerged; after many mornings' close watching with a hand-magnifier, I found some just expanding their wings at 3.50 a.m., and, though I have watched as soon as daylight appeared, I never found any out at an earlier hour; the greater number came out between 5 and 7 a.m., and others in the afternoon up to 7.30 p.m.

On May 28th, 1889, I was much pleased to find an empty pupa-case protruding from the top end of one of the infested straws (which I generally cut from 1 in. to 1½ in. above the bend), and another pupa-case sticking out below the bend. Since then I have found several of these "climbing pupæ," which work their way up between the leaf-sheath and stem until they reach an opening; these observations fully confirm those made by Asa Fitch.

The great power the pupæ possess to force their way up was shown in the following experiment: on April 18th, 1888, I buried twenty-four infested straws one inch deep in light soil, exposing the pot to all sorts of weather, and on June 11th I found a female fly on the gauze covering; it had managed to find its way through the earth somehow, but, as I could not find the empty pupa-case, I cannot say whether the fly or pupa ascended. On July 3rd I examined the buried straws, and found several puparia, one containing a pupa about four days old.

Having now seen almost every transformation, I was most anxious to observe that of the fly from the pupa *in situ*, and for this purpose I arranged a number of infested straws stuck into pots of damp sand, and in such position that I could examine each one easily and *quickly*, for the first appearance of a pupa might take place in, say, the No. 10 pot while I was going over No. 1; in fact, this happened repeatedly, until on June 7th, at 6.45 p.m., after numerous hours of morning and evening examination, I was fortunate in focussing my magnifier upon a straw which seemed to shake very slightly. I continued watching it, and in another minute or two I saw the cuticle of the leaf-sheath begin to swell at a tiny point just above the joint, as though something was pushing it outwards and *downwards;* presently a small brown beak-like process appeared and disappeared, but as quickly came into view again, as it made a forward curved movement, the hard, sharp, chitinous beak cutting through the sheath, which was soon widened sufficiently to permit the pupa working its thorax through; then a rest, followed by slight twisting and contortions, until the leg-sheaths were free and rested against the side of the stem, so forming a wonderful bracket or support. The leaf-sheath had partially closed, and gently nipped the end of the pupa, and so preventing it falling out—another of those perfect provisions of Nature which cannot fail to excite feelings of intense wonder and admiration

in the hearts and minds of those who are content to follow closely these marvellous transformations.

The pupa now commenced to bend its head down several times, when the skin burst at the top and back of the thorax, from which the fly (a male) slowly and majestically seemed to rise, until it had protruded as far as the eighth segment, the antennæ, wings and legs being pressed closely around it.

It now commenced bending backwards and forwards, occasionally stopping to give a peculiar sort of lifting movement, after which it succeeded in withdrawing its antennæ, moving them up and down; continuing the back and forward movements, it partially released its wings, and began to draw up its legs from out their delicate sheaths, making great muscular efforts to release its wings, until at last one became free, then renewed exertion to get its legs out, the femora of the first and second pair projecting in front; the other wing was next released, and both hung over the back like two bits of stick; then first leg free, then the second; the antennæ during these contortions had been gradually expanding their whorls of hairs; the third pair of femora now began to project, and the fly looked as though it might fall out and be injured; but just when the second pair of legs were quite free, it swung them about until one caught hold of the stem, towards which the fly immediately drew itself until it had a firm hold, when it quickly withdrew the remaining pair of legs, becoming quite free and walking along on the under side of the bent straw, hung attached by its first and second pair of legs, with the abdomen perpendicular, and the claspers on the tail in the same position; the stick-like wings were flapped together over its back a number of times, and in a quarter of an hour were fully expanded, and then crossed in position; the anal claspers turned up over the back, the tips bent downwards, and at 8.30 p.m., or exactly an hour and a quarter after the straw was split, the fly made its first flight. The tiny silvery shroud or pupa-case is left still protruding from the straw. I have watched flies, both males and females, emerge from isolated pupæ, many of which had great difficulty in freeing their legs from their delicate sheaths, and often became helpless cripples; and yet some of them will manage to crawl to a plant, and lay their eggs in one place; one of these laid eighty eggs on one leaf. Three

or four hours after emerging the males become very restless, flying about in search of a partner; the females hang to the under side of the leaves, with the ovipositor fully extended, and, unless disturbed, they appear very sluggish; copulation usually takes place about noon, and only for a few seconds. Immediately after, the female flies to the young plants or fresh leaves, and commences ovipositing; she generally alights on the leaf, and quickly crawls to the upper side, keeping her head towards the tip of the leaf; she taps the surface with her antennæ, and, arching her abdomen until the tip touches the leaf, she appears to give it a wiping movement towards her head, and in so doing extrudes an egg from the orifice, which is, you will notice, not quite at the end; this action she continues, tapping each time with her antennæ and keeping her head down; sometimes she alights on the stem, and crawls up until she reaches the edge of the leaf-sheath, when she arches the abdomen so much that the tip is brought between her front legs, and she seems to push the eggs in between the leaf-sheath and stem; at other times she will lay them right up to the tip of the leaf. When once a female has started ovipositing, she continues at it in the most business-like manner, passing from plant to plant until her task is done, when she appears weak, often having lost or broken one or two legs, frequently laying her eggs on the stem just above the ground, and then, when quite exhausted, she hides away in the earth to die. They are very careful to avoid ovipositing on mouldy leaves, and when at rest both male and female keep the tarsal joints and abdomen close down to the surface of the leaves.

On Aug. 6th, 1888, I bred one male and three females from one pot of puparia; these I placed under a muslin cylinder enclosing young barley plants, upon which I observed each female ovipositing, and *all* the eggs hatched on Aug. 12th.

On Aug. 8th three more virgin flies were put with *one* male, and with the same result, *viz.*, that all the eggs laid hatched four days after.

On the 7th I found six females out in one pot. I placed these under another cylinder containing *one* male, and again with the same result, each female ovipositing on separate plants, which I most carefully marked, and when examined on the fourth day, *all* had hatched.

These and other experiments proved that *one* male is capable of impregnating from one to *six* females. I have noticed females ovipositing at 6 a.m., and as late as 7 p.m.

During July and August I bred a great number of females, so determined to see whether they were parthenogenetic. I placed half-a-dozen of these virgin females in separate phials, upon the sides and corks of which all oviposited after a few days, but all these dried up in less than a week.

On May 21st, 1889, five virgin flies were "calling," and all laid a number of eggs, which I examined most carefully under my microscope, but could not see any change. I examined them each day until June 5th, when all were shrivelled up.

I isolated a great many virgin females, but not one of the many hundreds of eggs laid ever hatched, so I conclude that the Hessian Fly is not parthenogenetic. I put four females bred May 20th, 1889, under a cylinder with young barley plants, and they continued to "call," keeping the ovipositor slightly in motion and fully extended for two or three days, but apparently came to the conclusion that there were no partners to be had, so they commenced ovipositing, and all died by the fifth day.

From the behaviour of the females in captivity, I should say that they were very shy in their habits, hiding under the leaves and flying but a short distance above the ground; for though I have repeatedly swept the stubble and young growing barley, only once (Sept. 23rd, 1887) did I obtain a female. I have frequently observed them hide away in holes and crannies in the earth, also that they are particularly fond of resting there, their colour, I think, protecting them from being readily seen by birds. The males fly long distances, as proved by those which I captured on the windows of Bownham House, Stroud, Sept. 22nd, 1888, the nearest barley or wheat field being about three-quarters of a mile away.

My own observations fully confirm all that Prof. C. V. Riley and others have stated concerning the weather most favourable for the development of the Hessian Fly. A warm, damp, "muggy" atmosphere is decidedly the best; the larvæ thrive quickest in moist and rainy weather, and the puparia appear as though they could

stand any amount of wet; the pots in which I have kept isolated puparia and those with the infested straws have frequently been flooded for hours together an inch deep, without sustaining the slightest injury; in fact, moisture is of most vital importance to their existence.

On Aug. 9th, 1889, in a letter to the 'Echo,' I expressed an opinion that, owing to the wet weather and backwardness of the wheat and barley crops, there was every probability of being three broods instead of *two*, the second brood emerging early in August; these laid their eggs on young plants, and some of the flies of the third brood did emerge in September.

Though moisture is of such importance to their welfare, and hastens their development, it is astonishing how very tenacious they are of life. In season of drought their development may be greatly retarded—far longer than even Herr Wagner appears to have observed, for he states that "The first part of the Hessian Troops left Cassel in March, 1776, landing in Long Island Aug. 12th; the packing straw used by them must have been that grown in 1775, and in the ordinary course of Nature the pupa which might have been in the straw ought to have hatched April and May, 1776, and the flies of course died *before* reaching Long Island." This would have been correct, supposing all the flies had emerged; and though it is a matter of very small importance whether the fly was introduced into America by the Hessian troops, or from some other source, the following *facts* will show that under certain conditions the development of this insect is frequently retarded to a very long time, or more than *twice* as long as Herr Wagner states.

On March 9th, 1889, I received from Mr. Palmer two sacks of barley screenings, one from the harvest of 1888, and the other from 1887; this one, Mr. Palmer informed me, had been tied up all ready to send to me, but from some cause had been put away in a dry room and forgotten until sending the 1888 screenings, from which, on April 25th, I picked a large number of puparia. I then examined some from the 1887 crop, and was astonished to find several alive! though very much shrivelled; and out of a hundred puparia which I dissected, sixty-seven had dried up; from eighteen the parasites had emerged, and in fifteen the larvæ of the Hessian Fly were still alive, shrivelled up to half their natural length. I placed these on damp sand, and two

days after the resuscitated larvæ had worked themselves out, having, since they were placed on damp sand, imbibed sufficient moisture to enable them to apparently entirely recover from their long imprisonment. These, with a number of others from the 1887 screenings, were placed in the usual manner on blotting-paper on damp sand, so that I could observe all changes. On May 14th I noticed one of the larvæ had assumed a faint rosy tint, such as is seen on a three-days-old pupa; and such this proved to be, though when placed under the microscope I discovered that the larva had not cast its skin, the anchor-process and everything else being still in place. In the course of two or three days I observed that most of the other larvæ had changed colour, and in each instance the larva had been unable to cast the skin; and yet, in spite of this impediment, the changes in the pupæ went on, and were plainly visible.

On May 24th, 1889, the first abnormal pupa had, after twisting and rolling about a distance of two inches, managed to cast its larval skin; and a day or two after the thorax split, but the fly did not seem able to emerge, and died *in situ*. Others seemed to arrive at maturity, and yet not one of these skin-clad pupæ produced a fully-developed and perfect fly. In another pot I placed a number of 1887 puparia just as I picked them out, and from these a perfect male Hessian Fly emerged May 9th. The rest of the screenings I put into a flat box under a large muslin tent out in the garden, where they were exposed to all sorts of weather, with very heavy rain.

On June 3rd the first male emerged, followed by a number of both sexes until July 2nd, when the last (a female) made her appearance. I had sown some barley under the tent, and upon this being pulled up I found a number of larvæ of various sizes about the crown of the plants. Now, if we put down May 15th as being *about* the time when eggs are laid by the first brood, we find that some of these Hessian Flies bred from 1887 harvest had been quite two years in the puparia!

Having now given the result of my observations upon the life-history and economy of the Hessian Fly, I will endeavour to show that something might be done to keep down and arrest the increase of this most injurious insect.

In the first place, I beg to call your attention to

copies of the results of my various collections of puparia, giving the dates when the flies and parasites emerged.

On Aug. 5th, 1887, in answer to an invitation from Mr. Palmer, who asked me to come and examine his fields, I paid a visit to the now well-known Revell's Hall, Hertford. The barley was in splendid condition for examining, and I had no difficulty in picking out the infested straws, for they were very plentiful, and in two hours I had cut over three hundred.

Aug. 8th. I searched another field, but, before doing so, I proceeded to mark out with net-sticks and umbrella a distance of twenty yards up the rows. Starting to walk slowly between these, I examined three rows at either side, cutting with a large pair of scissors the bent straws into lengths of about two inches, counting and placing them in a bag slung round my neck; arrived at the distance-stake, I noted down the result, moved the stake further along, and resumed my work "all among the barley"; but I did not feel at all "*free*" (as the well-known glee goes), for the barley "haulm," as most folks know, has a peculiar knack of getting up the sleeves, and, after travelling about, emerges at the neck. At first this was decidedly irritating, but, as "familiarity breeds contempt," I soon got used to it, and went on with my search, until the sound of a country church clock striking the hour told me I had worked just four hours, during which time I had traversed a distance of eighty yards by twenty, and cut over 800 straws, each of which contained from one to four puparia. From these I bred 280 Hessian Flies and 358 parasites of various kinds.

In 1888 I made collections on July 5th and 17th, and on Aug. 3rd and 15th, spending about four hours each time in cutting the bent straws; and though wet weather interfered a good deal with my operations, I obtained 1458 infested straws. In addition to these, Mr. Palmer sent to me two bags of screenings, one from 1887 harvest, which I have already described, and the other from 1888 crop; and from this, after many tedious hours' work, much lightened by the help of my wife, we picked 1694 puparia, more or less injured by the thresher, but, in spite of this, 261 Hessian Flies and 319 parasites emerged.

During the year 1889 the weather was so bad that I had only one day's collecting, and then my search was stopped several times by heavy thunderstorms and drenching rain, rendering a barley field anything but a

dry spot to be in; this, in conjunction with the laid barley, made my task a hard one, and yet I managed to obtain 500 bent straws, and, had the weather been finer, I could easily have obtained twice that number. Mr. Palmer sent me another sack of the screenings from this harvest, the puparia being so plentiful that in one hour I picked out 270, the largest number ever found in that time, and, from what Mr. Palmer told me, and my own observations, I think the attack was the most serious I had yet seen.

The sum total of infested straws and puparia collected in two years was 4451, from which I bred 752 Hessian Flies! and 909 parasites. All the flies I killed and used for microscopic investigation, and of the parasites I have turned a large number down in infested districts.

HESSIAN FLIES AND PARASITES BRED FROM 1309 PUPARIA COLLECTED IN THE STRAW, AUG. 5TH AND 8TH, 1887.

DATE.	HESSIAN FLIES.		PARASITES.		TIME OF EMERGENCE.	WIND.	WEATHER.
1887.	♂	♀	♂	♀			
Aug. 7			1				
10				1			
11			2	1			
14			1	1			
18				2			
19				1			
21			2	1			
24			3	3			
25				2			
27				3			
29			4	11			
30			1	6			
31			1				
Sept. 1			4	3			
3				1			
9			1				
11		1			4 p.m.	W.	Dull.
17				1			Dull.
18		1			7 a.m.	W.	Dull.
23				1			
28				1			
1888.							
April 28			1	1			
May 16			2				
18			3				
19	1		2			N.W.	Warm.

Date.	Hessian Flies.		Parasites.		Time of Emergence.	Wind.	Weather.
1888.	♂	♀	♂	♀			
May 20	1		2			N.W.	Warm.
21			1				
22	1	2	1	3	4 a.m.	S.E.	Dull.
23	1				6 a.m.	E.	Windy.
24	3	5			6 to 7 a.m.	E.	Windy, very bright.
25	2	6		2		E.	Dull and cold.
26	1	1	3	2		E.	Cold.
27	4	1		2	6 a.m. to 7 p.m.	E.	Cold.
28	5		2	1		E.N.E.	Cold.
29	1	1	1	2			
30	2	2	8	7		E.S.E.	Rain and warmer.
31	1	1	3	4		S.W.	Rain and warmer.
June 1		2	3	2		S.W.	Sultry and dull.
2	2	3	5	2	3 p.m.	S.W.	Sultry & very warm.
3	1		9	13		S.W.	Sultry & very warm.
4	1		10	10		S.W.	Sultry & very warm.
5		1	7	2		N.E.	Cold and dull.
6			9	3			
June 7	3		5	1		W.	Fine to rain.
8	1		2	8	7 a.m.	W.	Rain.
9		1	1	3	3.50 a.m.	W.	Rain.
10			3	3			
11		1	4	6			Cooler.
12	1		9	16			Finer.
13		1	4	5			
14			4	14			
15	1			5		W.	Much rain.
16			3	3			
17				6			
18			1	4			
19			3	1			
20			1	1			
21			1	1			
22			4	1			
23			2	9			
24				3			
25		1	1	1			
26				1			
27		1		7			
28		1		1			
29				1			
30			1	3			
July 1				1			
2				1			
4		1					
6				1			

Date.	Hessian Flies.		Parasites.		Time of Emergence.	Wind.	Weather.
1888.	♂	♀	♂	♀			
July 7				2			
12				2			
23			1				
29	2						
30	1	2					
31	7	4					
Aug. 1	1	7			3 a.m.	E.	Wet.
2	14	1			6 a.m.	W.	
3	6	7			6 a.m.	W.	Glorious day.
4	12	9			4 a.m. to 6 p.m.	W.	Glorious day.
5	5	10			2 p.m.	W.	Fine.
6	1	10			4 a.m. to 6 p.m.	W.	Dull and wet.
7	4	8				W.	
8	2	5				W.	Very close & sultry.
9	7	9	1			W.	Very close & sultry.
10	5	4				W.	Very close and rain.
11	8	13				W.	Very close.
12	4	4				W.	
13		2				W.	
16		1				E.	
20			1				
21				1			
23			1				
24				1			
25			1				
Sept. 13	1	1					
14	1	1					
15	1			1			Fine and muggy.
16	4	6	1	1	6 a.m. to 6 p.m.	W.S.W.	Muggy to rain.
17	2	4					Dull and cooler.
18	3	1				N.W.	
19	4	5				E.	Fine.
20		3				E.	
21	1					E.	
Oct. 27				1			
♂	129	151	147	211			
♀	151			147			
	280			358	Parasites bred.		
				280	Hessian Flies bred.		

Total ... 638 Flies and parasites bred from 1309 puparia collected in straw during 1887.

Hessian Flies and Parasites bred from 1458 Puparia collected July 5th to Aug. 15th, 1888.

Date.	Flies.		Parasites		Wind.	Weather.
1888.	♂	♀	♂	♀		
July 25		1			W.	
26	1				W.	
27	1				W.	Wet.
29	1	1			W.	
30	2	4			W.	Fine to wet.
Aug. 2	1				E.	
4	1				W.	
5	1	1				Wet.
16		1				
19		1				
20			1	1		
22		2		1		
23		3	1	1		Wet.
24		1	1			Fine.
25		1				
27				2	N.	
29		1		1	N.W.	Wet.
30				1		
31				2		
Sept. 1				1		
2		1			N.W.	Wet.
3				1	N.W.	Wet.
5			1	1	N.W.	Wet.
6	1		1	1	S.W.	Fine.
7				1	S.W.	Fine.
9		1		1	E.S.E.	Wet to fine.
10				1	E.	
12			2		W.S.W.	Fine.
13			1	1	E.S.E.	Fine.
14			2	1	E.S.E.	Fine.
15		2		1	N.N.W.	Fine.
16			3	1	N.N.W.	
17	1			1		
18				1		
19	1					
20				1	E.S.E.	
21		1				
22		1				
23	2	1	1		N.E.	Dull.
24		2	1			Dull and muggy.
25			1	2		
26				1		
27				1		
Oct. 1				1		
2			1			
15			1			
22				2		

Date.	Flies.		Parasites.		Wind.	Weather.
1888.	♂	♀	♂	♀		
23				1		
27				2		
Nov. 26			1			
1889.						
May 17						Cool.
18		1				
21	2					
22	1	1			S.E.	Warm.
23	2	2				Sultry.
24	2	4			S.W.	Sultry.
25	3	3			S.W.	Warm.
26	2				S.W.	Wet.
28	2	1			S.W.	Wet.
29	11	6			S.W.	Wet and cool.
30	1	2		1		
31	3	9			S.W.	Wet and cool.
June 1	3	14				Warm.
2	8	15			S.W.	Very warm.
3	7	7			S.W.	
4		9			S.W.	
5	3	7				Dull and warm.
6	3	5			N.E.	Dull and cool.
7	6	3	4		N.E.	Very cold and wet.
8	1	5	2		N.E.	Much cooler. [50°.
9	1	2	1		N.E.	Very much cooler:
11	3	1	2		N.E.	Dull and dark.
12	1		1			
13		1	4	1	N.E.	Dull and dark.
14		1	6	1		Dull and cold.
15			8		N.	Dull.
16	1		3	3		
17			9	3	N.W.	Warm.
18	1		4	2	N.W.	Warm.
19			6	5	N.E.	
20			6	4	N.E.	
21			8	8	N.E.	Rain.
22			6	7		
23			6	6	N.	Very warm.
24			2	3	N.E.	Warm.
25			4	4	N.E.	
26			2	4		
27	1		3	3	N.E.	Very warm.
28			2	4		
29	1		2	2		Very warm.
30			1	5		
July 1				1	N.W.	Cooler.
2				1		
4				4	N.	Cooler.
5			1	1	S.E.	
7			1	5	W.	
8				2	N.E.	Cool.

Date.	Flies.		Parasites.		Wind.	Weather.
	♂	♀	♂	♀		
9				2	W.	Rain.
11				1		
14				1	W.	Wet.
15				1		
21				1		
Aug. 13	1				N.W.	Wet.
18		1			N.W.	Wet and warm.
Sept. 1	1		1		N.W.	Warm: very hot.
10		1				
♂	84	127	113	119		
		84		113		
Flies		211		232	Parasites.	
				211	Flies.	
				443	Total bred from 1458 puparia.	

Flies and Parasites bred from 1694 Puparia picked from Screenings from 1888 Harvest.

Date.	Flies.		Parasites.	
1889.	♂	♀	♂	♀
May 1			2	
4				1
5				
to			25	12
9				4
7	1			
10	3	4		
11	2	3	10	13
12	2	1	18	16
13	3	5	13	8
14	2			
15	2			
16	2	2		
17	1	1		
18	1	1		
19		2		
14—19			28	28
20	1			
21	1			
22	2			
23	1	2		
24	1	1		
20—24			18	17
25		1		
26		1		

Date.	Flies.		Parasites.	
1839.	♂	♀	♂	♀
May 27	1			
25—27			9	15
28	4	3		
29	2	1		
28—30			8	15
30	2	1		
31		2	4	4
June 2		1	3	
3 & 4	1	2	9	7
5			6	9
11			4	9
14			1	
July 21			1	1
July 26	7	4		
27 & 29	4	4		
30	6	1	1	
31	9	9		
Aug. 1	1	3		
♂	62	55	160	159
♀	55			160
	144	Larvæ.		
				319
	261	Flies.		
	319	Parasites.		
	580	Bred from 1694 puparia.		

FLIES AND PARASITES BRED FROM PUPARIA FROM AMERICAN "FALL WHEAT."

DATE.	FLIES.	
1889.	♂	♀
May 5		1
6	6	2
7	4	7
8	7	7
9	3	5
10	7	3
11	3	4
12	6	3
13	5	1
14	1	
15	2	1
16		2
22		1
♂	44	37
♀	37	
	81	

DATE.	PARASITES
1889.	? sex
June 5	5
13	10
16	4
July 5	3
	22 Parasites bred.

On June 11th I sent over 300 of the parasite, *Semiotellus nigripes*, to Prof. Riley for the purpose of acclimatisation, but owing to the heat, &c., surrounding the mail bags, all died in transit. In the course of February and March I hope to be able to send a large number of puparia picked from screenings, and no doubt from these Prof. Riley and his assistants will be able to breed this exceedingly plentiful and most useful parasite in such numbers that it will soon obtain a footing in the United States, and, I trust, will make its presence felt.

Since reading this paper, I have sent over 2000 puparia to Prof. Riley, of the U. S. Department of Agriculture at Washington, and to-day, May 8th, have received a letter as follows:—"I duly received your favour of April 9th, and the accompanying box of puparia. I am glad to say that these arrived in good condition, and that many of the parasites have already begun to issue; and that I have made arrangements to distribute them at four different points, so that I think the result of this experiment will be satisfactory."

During Sept., 1888, I found the puparia exceedingly plentiful all round the neighbourhood of Stroud, Gloucestershire, which is the most westerly point where "the

pest" has been recorded from; *not* that it had not occurred there before, but there were no persons who troubled themselves to examine the crops. At Acock's Green, near Birmingham, I found puparia in plenty in the barley stubble, together with the rarest thing I have ever met with, *viz.*, a *satisfied* farmer: one who (as he said) "didn't care a straw if the Hessian Fly *was* in his fields; he had had a good crop, and what more did he want? except to have me locked up for trespassing in his fields of stubble"! This specimen of an English farmer had not *always* been so contented; for years ago, so he told me, his crops of mangolds "had been eaten up by the worm as turned to a little mot as lays thousands of eggs in a minute! *he* knew, and had seen 'em do it in his '*at!*" The remembrance of this "little mot" was indeed bitter to this old ignoramus, who positively raved about it, and wanted to know why "Parlimint didn't do summut to help the poor farmer to live?" I quite agreed with him that something ought to be done, and so we parted good friends.

Another farmer at Evesham had heard something about the Hessian Fly, but "hadn't bothered himself about it," though on examination of the stubble I found the puparia in plenty. I asked, What had he done with the screenings? "Oh, chucked 'em in a heap under a clump of trees" was his reply, and there I found them just as they had come from the thresher; the farmer had made a "midden heap" of them, and that was enough for him; and *more* than enough for others—for the abundant spread of the Hessian Fly over their fields.

On Aug. 24th I wrote a letter to 'The Times,' suggesting the advisability of collecting the bent straws breeding the parasites, to turn down, and of course killing the flies. I argued then, as I do now, that if *one* person can in about four hours collect about 2000 puparia, a properly organised staff would be able to show far more important results; but though several papers noticed and commented on my letter, I believe I was the only person who continued to collect and breed the parasites.

I am afraid that very little preventive work can be done whilst the eggs are being laid; as this takes place from the latter end of April right on to the end of June, and it would be impossible to search the growing barley;

and even *after* harvest, when there are so many self-sown plants, I doubt if it would answer.

During the next stage, the larval, we do not see the result of their work; so we must wait another month, or until, say, the middle of July before we can find the bent straws, when, supposing there was any desire on the part of Government to do anything in the way of checking the pest, the puparia could, as I have already proved, be collected by thousands for the purpose of breeding the parasites.

As an instance of what can and has been done in importing the natural enemies of a most injurious pest, I cannot do better than call the attention of everyone here present to Prof. Riley's Report to the United States Committee of Agriculture on that most injurious pest, the Orange Scale (*Icerya Purchasi*), which, as most horticulturists know, has utterly ruined whole districts of orange-groves in California, &c., and bid fair to make a clean sweep, until its natural enemy was discovered in Australia; and Prof. Riley, acting with that promptitude and "cuteness" which is part of the character of our American cousins, suggested to the United States Commission that agents should be sent out to collect this natural enemy, a species of lady-bird, and in this the Government at once acquiesced; no time was lost in looking out "red tape," but the letter of submittal was made out, and Mr. Koebele started on his journey to Australia, "nothing doubting" or wanting either, determined to obtain the insect for which he was sent; no such thought as, "It can't be done," "It isn't practical," &c., ever entered his mind, but he went on and on, gradually gaining experience and obtaining specimens, which he quickly sent home; these were as quickly placed in a large muslin tent covering an orange tree which was infested with the scale, and here the *Vedalia* set to work to feed and lay their eggs; the larva soon hatched, and commenced feeding upon the *Icerya*, eating and breeding so fast that in a short time there were sufficient beetles to permit of the poor eaten-out orange-growers coming with their boxes, &c., to carry away dozens of these precious "bugs" to transfer to their orchards, with the result that in a very short time scarcely an *Icerya* could be found!

Now that we have a "Chamber of Agriculture," no

doubt our Government will do something of a practical nature to check the increase of these injurious insects; and I am sure that I only express the desire of all present to-night, that more attention may be given to the study of Economic Entomology, and that we are now within measurable distance of the time when the "poor distressed farmer" can go to the Natural History Museum and find comfort in studying the enemies of his crops, and also Nature's provision for the extermination of these pests.

If we want a pattern, we have only to turn to the United States of America, and its Department of Agriculture, with Dr. C. V. Riley at the head of the Entomological Division, aided by his assistants, all of whom seem to have imbibed his spirit. Any farmer, or anyone who is *not* a farmer, who may write to the Department about any insect is always treated in the most courteous manner, and should the letter relate to any insect little known, an agent is sent down to make enquiries, and not many months pass before the life-history and economy is known from beginning to end. I would here mention how very much I am indebted to Prof. Riley for his long-continued kindness and help in my study of the Hessian Fly and its *parasites;* and I would call special attention to that most useful of entomological pamphlets, 'Insect Life,' published by the Bureau of Agriculture, which contains the most practical suggestions relative to Economic Entomology, with numerous figures of insects, and details generally passed over by British entomologists.

No doubt all who are here present will recollect the profound sensation caused among the inhabitants of Great Britain during the autumn of 1886, when the announcement was made that the Hessian Fly had been discovered in Hertfordshire. The newspapers were full of long articles written by learned and *un*learned men, and in the periodicals figures of "the pest" were given; "latest news" and bulletins were issued with surprising rapidity, reporting the advance of the enemy, and that it was gradually spreading; but from this latter opinion I entirely disagreed, and I have not changed my opinion, that in whatever barley field, in whatever county an intelligent farmer or practical entomologist searched, there would be found the puparia of the Hessian Fly; and I quite agree with Prof. Riley that it had been

breeding in Great Britain for some years, and we must confess that it had been overlooked until Mr. G. Palmer discovered it in his barley fields, July 27th, 1886.

In September last (1890), whilst on a visit to friends in the island of Portland, I searched both wheat and barley fields with the usual result, that I found puparia in all of them; the last one visited surrounded the well-known lighthouse at "Portland Bill," the furthermost point on the island, and here the barley was still standing; and five minutes' search revealed both larvæ and puparia in the injured stems; these I showed to the keeper of the lighthouse, who informed me he had "heard tell of the Hessian Fly in the newspapers, but did not know how to go about to find it."

From reports we gather that some of the sleepy British farmers were stirred into activity to search for the pest, and in most cases found it in plenty; but, like all other things connected with Economic Entomology in Great Britain, the interest at first taken in the Hessian Fly has been gradually falling off, until in 1889 there were not (according to reports) a dozen farmers to be found in the whole land who cared one jot whether it was plentiful or not in their fields, though no doubt every one of them would have the usual grumble at the lightness of the crop.

All practical entomologists who have studied the Hessian Fly in the fields agree that the preservation of the natural remedy—the parasites—is of the greatest importance. Perhaps a few quotations on this important subject will not be out of place. Dr. Asa Fitch, who was about the first to study the Hessian Fly in America, asserted that it was of the highest importance to encourage these parasites.

In the 'Third Report of the United States of America Entomological Commission for 1882,' Dr. Packard, when referring to the subject of "burning the stubbles," writes:—"Although this remedy has been advocated, it will be seen to be worse than useless when we reflect that, after all the artificial means taken to reduce the number of the Hessian Fly, Nature's method of checking its undue increase is far more important and thorough-going; we refer to the diffusion and multiplication of the insect parasites. As previously stated, most probably nine-tenths of the young Hessian Flies are destroyed in the

larva or pupa state by the parasites already described. For the most part, these parasites live in the 'flax-seed' contained in the straw, and appear in spring. Now, to burn the stubble in the autumn or early spring is simply to destroy these useful parasites, the best friends of the farmer. We do not hesitate to urge that the straw be untouched. On the contrary, the parasites should be gathered and bred in numbers. and we believe that practical entomologists should bend all their energies towards clearing up the subject of rearing and multiplying these insect hosts. Much knowledge and practical skill is needed in this direction, as occasionally by disseminating the parasites their noxious hosts may be increased and distributed; but knowing, as we do, how many more of the parasites are in many cases bred than the insects on which they prey, it seems safe and reasonable to advise not only not burning the stubble, but letting it stand, so that the *parasites* may finish their transformations, become fledged, and ready, when the eggs and larvæ of the Hessian Fly are upon or in the young wheat, to destroy them. It is a matter of fact that in years when the Hessian Fly is specially abundant and destructive, similar seasons are highly favourable to the corresponding increase in the number of their insect or ichneumon parasites; they do their work so effectually that the few following years the numbers of Hessian Flies are greatly reduced. It is, then, to these parasites that we are indebted for the years of immunity from the the attacks of the Hessian Fly as much as to favourable and unfavourable weather."

Herr Wagner also states that, "The most effectual remedy in checking the excessive multiplication of the wheat-worm has been provided by Nature herself in the aid received from the parasites just mentioned. To spare them is a very important thing."

On July 30th, 1888, I ventured to bring the subject of breeding the parasites before the readers of the 'Mark Lane Express,' for since my letter to 'The Times' I had had another year's practical experience of rearing parasites, so could speak still more positively as to what could be done. This letter was replied to in the following week, Aug. 6th, but in a totally different manner to what might have been expected. I was told, "I was no farmer"; that "there were other difficulties in the

practical applications of the subject, which a non-agriculturist may well be excused for not knowing, &c."; and in a subsequent letter, in reply to mine, the following most extraordinary paragraph appeared, *viz.*, "It does not therefore follow that we are sure of their (the parasites') services; male and female have to meet, eggs be fertilised, and the female must find her way to the infested fields and stalks before the egg can be laid"!

I must confess that I had never read anything connected with Economic Entomology which amused me so much as the remark that male insects have any difficulty in finding the females, and *vice versâ*. Why? Was it not one of the first commands given to animals, "to be fruitful and multiply"? and have we ever heard of female flies experiencing any difficulty in finding out the right place to deposit their eggs? Are they idle and feel "it can't be done," or do they ever forget to use their powers of flight and that most marvellous sense, whether of smell or touch, which enables them to know in an infinitesimally short time in what direction the food lies upon which their progeny must feed?

If they were under the guidance of a Committee, no doubt they would experience the greatest difficulty in these matters; but being the work of the Creator, they are endowed with such powers that they do everything in accordance with His purpose; and whatever purpose or duty they have to perform, their whole life and energy seems taken up in carrying out that purpose. What a lesson is here set forth for us to go and do likewise!

For Explanation of Plate XVI. see next page.

Explanation of Plate XVI.

Fig. 1. Lateral and ventral view of head of larva (one day old) of Hessian Fly, × 140 diam.

2. Lateral and ventral view of feeding larva, × 8 diam.

3. Lateral and ventral view of head of feeding larva, × 36 diam.

4. Lateral and ventral view of puparium, × 8 diam.

5. Lateral and ventral view of third stage of larva, × 8 diam.

6. Lateral and ventral view of 1st, 2nd, and 3rd segments of ditto, showing the head and anchor-process, × 36 diam.

7. Head and anchor-process after having been squeezed flat, × 36 diam.

8. Lateral and ventral view of pupa, × 8 diam.

9. Vertical section through centre of barley-stalk, showing a feeding larva *in situ*.

10. Vertical section through centre of bent barley-stalk; puparium *in situ*.

11. Vertical section through centre of bent barley-stalk; 3rd stage larva *in situ* within the puparium, head *downwards* and *inwards* towards the stalk.

12. Vertical section through centre of bent barley-stalk; 3rd stage larva commencing to turn round.

13. Ditto, ditto, further advanced.

14. Ditto, ditto, half-way round.

15. Ditto, ditto, three-quarters round.

16. Ditto, ditto, larva reversed, showing head *upwards* and *outwards* towards the leaf-sheath.

17. Vertical section through centre of bent barley-stalk; pupa within puparium, and cast skin and anchor-process.

18. Bent barley-stalk; pupa protruding, previous to the fly emerging.

(Figs. 9 to 18 magnified 5 diam.)

XIII. *Mimetic resemblances between species of the Coleopterous genera* Lema *and* Diabrotica. By Charles J. Gahan, M.A., F.E.S., Assistant in the Zoological Department, British Museum.

[Read March 4th, 1891.]

Plate XVII.

When, a short time ago, I began to work at the phytophagous genus *Diabrotica*, I was somewhat puzzled to account for the strangely familiar appearances of some of the species; for I had never any reason, until then, to examine them very closely. Upon a little reflection, however, I suspected that, by looking into the cabinet drawers containing the species of *Lema*, which I had not long before arranged, I should be able to find the needful explanation. This suspicion proved correct. Certain species of *Lema* were seen to have the closest resemblance in colour and marking to those species of *Diabrotica* which had so perplexed me.

If only one or two out of the five hundred species of *Lema* resembled one of the four hundred or more species of *Diabrotica*, the fact need not be considered very extraordinary; but it certainly does seem deserving of notice that as many as fifteen or sixteen species of the one genus should present the most striking analogical resemblances to corresponding species of the other. The resemblance, it need scarcely be said, was found to be most pronounced between specimens from the same localities.

It would be fruitless to attempt to convey by description a clear idea of the similarity in colour and style of marking; so that I do not intend to give here more than a brief indication of the points of resemblance between a few of the species.

In *Diabrotica 10-guttata*, Oliv. (see Baly) — a very variable species, occurring abundantly in the Amazonian regions—the head is black, the eighth and ninth joints of the antennæ are whitish, the remaining joints brownish

black; the prothorax is yellowish tawny; the elytra, in typical examples, have a shining brownish black colour, and each is marked with five rounded tawny spots arranged in the order 2, 2, 1. The femora are fulvous, the tibiæ and tarsi black. A repetition of these details would almost exactly describe the coloration and style of marking of *Lema Batesii*, Baly, a species from the same regions. In this species, however, the two middle spots of each elytron are usually united to form a sort of transverse band.

In one variety of *D. 10-guttata* nearly all the black colour is obliterated from the basal three-fourths of the elytra; the apical spot on each remains surrounded by a somewhat irregular black border. This variety occurs in Ecuador and the Upper Amazons, and has its counterfeit in a species of *Lema* (*L. oculata*, Lac.), also from Ecuador.

Lema nigrovittata, Guér., found in Mexico and North America, has the elytra striped with black and yellow in close imitation of *Diabrotica vittata*, Fab., which is very common in the same localities.

Other striped species of the two genera are very much alike. The most remarkable, perhaps, are the Mexican species, *L. bisbivittata*, Clark, and *D. Fairmairei*, Baly. They are of about the same size. The pale yellow stripes of their elytra correspond almost exactly in position and in width. The elytra have in each species the same peculiar violet-brown ground colour, and they are, moreover, raised into narrow longitudinal costæ between the rows of punctures with which they are impressed. So that in colour, sculpture, and pattern of marking the elytra in the two species offer a strong resemblance.

It is not often that two species of different genera are more deceptively alike than *L. dimidiaticornis*, de Borre, and *D. lepida*, Say. These are also found in Mexico. The head and prothorax in both are of the same reddish colour. In *D. lepida* the elytra are glossy black, and each is marked with two confluent ivory-like spots near the middle, with a similar spot near the apex. In *L. dimidiaticornis* the elytra have a glossy bluish black colour, and are each marked with a transverse yellowish band at the middle, and with a spot of the same colour near the apex. The transverse band is often slightly constricted in its middle, so that it comes more closely to resemble the two confluent spots occupying a similar position in the *Diabrotica*.

Lema Buckleyi, Baly, and *Diabrotica elegans*, Baly, both from Ecuador, are extremely alike. The general tone of colour in each is a pale yellow. The elytra are crossed by two bright metallic-blue or green bands—one at the base, the other behind the middle. These bands in the two species correspond exactly in shape, extent, and position. Given the outline of one species to fill in, and the other species as a model from which to copy, it would be difficult for an artist to more faithfully reproduce the colours and design than Nature has done in this case.

It is a rather happy coincidence in nomenclature that the same specific name has been applied to a *Diabrotica* and a *Lema*, both from Central America, and both closely resembling each other. This name—*biannularis*—pretty well expresses the character common to the two species. In each the pale yellow elytra carry four somewhat circular metallic-blue figures. The two basal figures are usually complete circles, the two posterior figures are generally crescentic or arcuate in form.

Sufficient has been stated to show that the resemblances are not confined to species exhibiting one particular kind of pattern, but that almost every style of marking occurring in the genera is represented among the imitative forms.

It remains for me now to offer some explanation of the resemblances here recorded. I believe they are cases of true "mimicry"; that the species of *Diabrotica* are protected, and that the species of *Lema* derive advantage by mimicking them. At first it might seem that the Lemas, owing to the harder covering of their bodies, were the protected species, and that the softer-bodied Diabroticas were the *mimics*, just as certain Longicorns and other beetles mimic the hard *Curculionidæ*. But the following considerations will, I think, bear out in some measure the opinion which I have expressed.

The species of *Diabrotica* are very numerous in individuals, some of them occurring in swarms in the localities in which they are found. A considerable variety of colour and style of marking runs throughout the genus *Diabrotica*. This is true also, to some extent, of the Lemas of America; but, as a rule, the Lemas of the Old World, though often exhibiting metallic tints,

are much less varied in their markings. It would seem from this that certain species of *Lema* had departed somewhat from the style of marking prevalent in their genus in order to mimic species of *Diabrotica* living in the same localities. This view is all the more reasonable when it is taken into account that the shape of the elytra in some of the mimicking Lemas approximates more to that of the mimicked Diabroticas than to the form customary in their own genus. There are, in fact, one or two species of *Lema* with their elytra so shaped and coloured that one might almost venture to predict that they will be found to mimic species of *Galerucidæ*.

Mr. Bates has mentioned some cases of Longicorns which mimic *Galerucidæ*. One of these is *Oxylymma gibbicollis*, Bates, which, he says, closely resembles a species of *Diabrotica*.

Mr. Jacoby, without, I think, suggesting any explanation of the facts, has recorded that many of the species of his genus *Neobrotica* exhibit most striking resemblances to species of the closely-related genus *Diabrotica*.

There are a few species of other allied genera which also resemble species of *Diabrotica*. *Dircema fraterna*, described by the late Mr. Baly and originally placed by him in *Diabrotica*, has a most deceptive resemblance to *Diabrotica triplagiata*, a species from the same locality. This example is all the more remarkable, because *D. fraterna*, with its glabrous and highly polished elytra, is very unlike most of the other species of *Dircema*, which are covered with a kind of velvety pubescence.

If the species of *Diabrotica* are not favoured in some particular way, why do we find them mimicked not only by species of allied, but also by species of widely separated genera? The genus *Lema* is to be distinguished from *Diabrotica* by decided structural differences. In *Lema* the antennæ are inserted far apart, and the prothorax is narrow and cylindrical in form. In *Diabrotica* the antennæ are quite close together at their points of insertion, and the prothorax is somewhat flattened, and has sharp lateral edges. The two genera belong, in fact, to different subfamilies. Common ancestry cannot, therefore, be regarded as a possible explanation of the resemblance between species of the two genera. Similarity in their surroundings and in their habits of life

may have something to do with it. But if, as I have been led to suspect, the species of *Diabrotica* are protected by some nauseous property, this in itself would be a sufficient explanation. I have, within the last few weeks, been able to get some evidence tending to show that the species of *Diabrotica* are so protected.

Lacordaire, in his 'Mémoire sur les habitudes des Insectes coléoptères de l'Amérique méridionale'* states, when writing of the genus *Galeruca*, that "the large species, *G. cyanipennis*, Fab., *xanthodera*, *lycoides*, Dej., &c., simulate death when captured, and secrete an abundant yellow fluid through their mouth and the joints of their legs. In another, *G. viridis*, Dej., this liquid is colourless, and sufficient in quantity to entirely cover the insect. The small species have not this faculty."† I have not been able to identify *G. cyanipennis*, Fab., but it is given in Gemminger's catalogue as a species of *Diabrotica*. The *G. viridis* of Dejean has been described by von Harold under the name of *Diabrotica marginata*. Neither of these is in the list of mimicked species which I have appended. But it is safe, I think, to assume that Lacordaire's observations apply to all the larger species of *Diabrotica*. The secretion of a special fluid of this kind is usually found to be a protection to the insect which secretes it. It might be argued that the species of *Lema* are, perhaps, similarly protected. At present there is no evidence to show this. Lacordaire has carefully noted the different genera whose species secrete a nauseous fluid, but in referring to *Lema* he does not mention this property. In reference to this point, three species of *Lema* from Borneo are very suggestive. These, at first sight, look very unlike Lemas, and might easily be mistaken for *Hispidæ*. In *Lema monstrosa*, Baly, the resemblance is greatest. The rough elytra of this species are furnished with a number of highly-raised and sharply-pointed conical tubercles. In its red-coloured thorax and black elytra it agrees with a species of *Hispa* found in the same island. You have only to imagine the very fine ends of the Hispa's spines to be broken off in order to arrive at the style of armour met with in the *Lema*. The remaining two species of *Lema* mimic the *Hispa* in the same way, but to a less degree.

* 'Annales des Sciences Naturelles,' vols. xx. and xxi.

† *L. c.*, xxi., p. 189.

The three species form, in fact, a graduated series, showing how the process of adaptation has gone on. As is the rule in such cases, the mimicked *Hispa* appears to be abundant, whereas the mimicking Lemas are apparently very rare.

As an additional reason for believing that the species of *Diabrotica* are a protected group, it may be mentioned that some of the species belonging to one section in this genus are, in colour and marking, extremely like certain species of the other section which come from the same localities. Now this, according to Mr. Wallace, is a phenomenon that does not often occur in unprotected groups, though it is frequently to be met with in protected genera.

The resemblances between species of *Neobrotica* and certain species of *Diabrotica* will probably have to be placed in the same category as those between species belonging to the two different sections of *Diabrotica*.

Fresh observations upon the species of *Lema* and *Diabrotica* in their living state will have to be made before it can be definitely established that the resemblances between them are cases of true mimicry; but the facts, so far as they are at present known, are, I submit, strongly in favour of this conclusion.

List of the Species.

Those that closely resemble each other are bracketed together :—

	Habitat.
Lema Batesii, Baly	Amazons.
Diabrotica 10-*guttata*, Oliv.	,, and Cayenne.
Lema oculata, Lac.	Ecuador.
Diabrotica 10-*guttata*, Oliv., var.	,, , Upper Amazons.
Lema nigrovittata, Guér.	Mexico and N. America.
Diabrotica vittata, Fab.	,, ,,
Lema bisbivittata, Clark	Mexico.
Diabrotica Fairmairei, Baly	,,
Lema vittatipennis, Baly	Amazons.
Diabrotica separata, Baly	,,
Lema Buckleyi, Baly	Ecuador.
Diabrotica elegans, Baly	,, and Colombia.
Lema Championi, Jac.	Panama.
Diabrotica Godmani, Jac.	,,
Neobrotica cœruleofasciata, Jac.	,,

	Habitat.
Lema biannularis, Clark	Mexico and Guatemala.
Diabrotica biannularis, v. Harold...	,, Guatemala, and
Neobrotica ornata, Jac.	,, [Honduras.
Lema ducalis, ...	Colombia.
Diabrotica elegantula, Baly	,,
Lema semisepta, Lac.	South Brazil.
Diabrotica piceosignata, Baly	,,
**D. zelota*, sp. n.	,,
Lema trivirgata, Lac., var.	Peru. [Amazons.
Diabrotica boliviana, v. Harold ...	,, Bolivia, and Upper
Lema Suffriani, Jac.	Costa Rica.
Diabrotica 9-maculata, Jac.	,,
Neobrotica imitans, Jac.	,,
Lema bifida, Oliv.	Cayenne.
Diabrotica 5-maculata, Fab.	,,
Lema mystica, Lac., var.	South Brazil.
Diabrotica Clarkella, Baly.....	,,
Lema dia, Baly.....	Amazons.
Diabrotica alcyone, Baly	,,
Lema amazona, Baly	Upper Amazons.
†*Diabrotica triplagiata*, Baly	,,
Lema dimidiaticornis, de Borre ...	Mexico.
Diabrotica lepida, Say	,,
Lema crucifera, Clark.....	Cayenne.
‡*Cerotoma arcuata*, Oliv.	,,

* This species may be briefly characterised as follows:—Head and hind breast black; prothorax transverse, nitid, testaceous; elytra yellowish, with the suture anteriorly, a submarginal band on each extending from the shoulder to near the apex, and a small spot on each just inside the hinder extremity of the lateral band, black. Antennæ dark brown, with the scape yellowish brown, and three or four of the apical joints pale tawny; with the third, fourth, and fifth joints thickened in the male. Legs tawny; intermediate tibiæ in the male slightly curved, thickened from above the middle to the discal extremity; intermediate femora in the male each with a small tooth a little below the middle of the ventral side. Middle legs in the female normal.

† *Dircema fraterna*, Baly, is deceptively like *Diabrotica triplagiata*, and is found in the same localities.

‡ The genus *Cerotoma* is nearly allied to *Diabrotica*.

For Explanation of Plate XVII. see next page.

Explanation of Plate XVII.

Fig. 1. *Diabrotica* 10-*guttata*, Oliv.
2. *Lema Batesii*, Baly.
3. *Diabrotica* 10-*guttata*, Oliv., var.
4. *Lema oculata*, Lac.
5. *Diabrotica vittata*, Fab.
6. *Lema nigrovittata*, Guér..
7. *Diabrotica triplagiata*, Baly.
8. *Lema amazona*, Baly.
9. *Diabrotica elegans*, Baly.
10. *Lema Buckleyi*, Baly.
11. *Diabrotica alcyone*, Baly.
12. *Lema dia*, Baly.
13. *Diabrotica lepida*, Say.
14. *Lema dimidiaticornis*, de Borre.
15. *Diabrotica biannularis*, v. Harold.
16. *Lema biannularis*, Clark.
17. *Diabrotica boliviana*, v. Harold.
18. *Lema trivirgata*, Lac., var.
19. *Cerotoma arcuaia*, Oliv.
20. *Lema crucifera*, Clark.

The figures are drawn twice the natural size; the effect of which is to exaggerate the differences and diminish the resemblances between the species.

XIV. *A list of the Heteromerous Coleoptera collected by* Mr. J. J. Walker, R.N., F.L.S., *in the region of the Straits of Gibraltar, with descriptions of four new species.* By George C. Champion, F.Z.S.

[Read April 1st, 1891.]

The following list of the Heteromerous Coleoptera from the Straits of Gibraltar is intended as a continuation of the paper contributed by Mr. Walker himself on the Macro-Lepidoptera of this region (Trans. Ent. Soc. Lond., 1890, pp. 361, *et seq.*). Mr. Walker's captures include many species not recorded by Rosenhauer in his important work, 'Die Thiere Andalusiens' (1856); Mr. Walker, however, was unable to collect so far inland as the Sierra Nevada, where very many of Rosenhauer's insects were obtained. The collection made by him at Gibraltar (including Algeciras, the cork-woods, &c., a radius of at least ten miles inland) is a very extensive one, and must be by far the most complete ever got together at this place. A certain number of species were obtained at Malaga, and these are also included. On the opposite coast, at Ceuta, Djebel Mousa (Apes' Hill), Esmir, Tetuan, Benzús Bay, Tangier, Peregil Island, &c., important but less extensive collections were made, more especially in the vicinity of Tetuan; his opportunities of visiting Tangier were, however, few and far between, so that he did not obtain examples of many well-known Tangier species. The Gibraltar collection cannot contain fewer than 1200 species of Coleoptera; examples of about 950 of these were exhibited by myself on one occasion at a meeting of this Society. With the Maroccan insects, and the few collected at Malaga, the total number of species of Coleoptera obtained probably exceeds 1500.

From the point of geographical distribution the collection is particularly interesting, as showing which species are confined to the European and which to the

African side of the Straits, and those that are common to both. As it would necessarily take a considerable time to determine such a large number of species, a list of the "Heteromera" is offered as a first instalment, in the hope that lists of the species of the other groups of the Coleoptera may be subsequently supplied, either by myself or others.

Mr. Walker obtained altogether examples of 191 species of this group; of these 64 were met with on both sides of the Straits, 89 on the European side only, 38 on the African side only. Four or five species are additions to the European list, and four are described as new.

In addition to Rosenhauer's important work on the Andalusian Coleoptera, two other valuable papers have been published on the Coleoptera of this region:—(1). "Eine entomologische Wintercampagne in Spanien," by G. Dieck (Berl. ent. Zeitschr., 1870, pp. 145—184); an English translation of this interesting article is given in the 'Entomologist' for 1888, pp. 38—43, 75—81). This contains an account of the Coleoptera observed at various places on the European side (Algeciras, &c.), and also at Tangier, but a general summary of the species is not given. (2). "Entomologische Reise nach dem südlichen Spanien," by Lucas von Heyden (Berl. ent. Zeitschr., 1870, Beih. pp. 1—175).

Rosenhauer enumerated 205 species of Heteromera from Andalusia, but of these about thirty are inserted on the authority of Waltl, examples not having been obtained by him; some of Waltl's names (and Rosenhauer's also) are merely synonyms. This is a considerably larger number than Mr. Walker's (153), but it must be remembered that Rosenhauer collected in the Sierra Nevada, and also at Cadiz, Granada, Malaga, &c., as well as in the vicinity of Algeciras and Gibraltar; nevertheless, the following list adds about 56 species to Rosenhauer's list.

Of the species occurring on the Maroccan coast, and which do not cross the Straits, perhaps *Lagria viridipennis*, Fabr., is the most striking, it being abundant at Tetuan. *Helops tuberculipennis*, Luc., and *Oncomera marmorata*, Er., are not included in von Heyden, Reitter, and Weise's European Catalogue (1891). Of the four species described as new, two are from the

vicinity of Gibraltar, and two from the Maroccan coast. From a study of the following list it will be seen that by far the larger number of the species of the Heteromera are common to S. Europe and Marocco; but, as there is no published catalogue of the Maroccan Coleoptera, a precise analysis cannot be given.

I am indebted to Herr E. Reitter and M. Allard for their assistance in determining some of the doubtful forms, and also for furnishing me with examples of various species for comparison.

Marked * new to Rosenhauer's Andalusian list.

TENEBRIONIDÆ.

Zophosis minuta, Fabr. (*suborbicularis*, Sol.).

Gibraltar; sandy places, common. Also at Tetuan and Tangier.

Erodius tibialis, Linn. (*europæus*, Sol.).

Tangier; common. Not met with in the vicinity of Gibraltar, but recorded by Rosenhauer from San Lucar and Cadiz.

Erodius carinatus, Sol. (*latus*, Sol.).

Gibraltar; sandy places, plentiful. Also at Tetuan and Tangier.

Erodius rugosus, Kr. (*puncticollis*, Rosenh.).

Gibraltar; Campo Common, in summer; not common. Not observed on the Maroccan side of the Straits.

Pachychila Salzmanni, Sol.*

Gibraltar; in tufts, under stones, &c., common. Also at Ceuta, Tetuan, and Tangier. Recorded by Crotch from Gibraltar [Petites Nouv. Ent., i., p. 49 (1870)], and by Dieck from Algeciras, Gibraltar, and Tangier.

Pachychila nitens, Sol.*

Gibraltar; a few examples.

Pachychila Dejeani, Bess. (*subovata*, Bess.).

Tetuan; one example, perhaps belonging to this species.

Pachychila Steveni, Sol.

Tetuan; one specimen. Both this species and the preceding are upon the European list.

Pachychila Germari, Sol. (*bifida*, Rosenh.).

Gibraltar; sandy places, neutral ground, &c.; common. Also at Tetuan.

Tentyria elongata, Waltl (*sinuatocollis*, Rosenh.).

Gibraltar; sandy places, abundant. Also at Tetuan.

Tentyria gaditana, Rosenh.

Gibraltar; cork-woods, rare. September, 1887.

Tentyria platyceps, Stev. (*Goudoti*, Sol., *modesta*, Rosenh.).

Gibraltar; in tufts and under stones, Campo and San Roque. The var. *modesta* was found by Rosenhauer in the Sierra Nevada.

Tentyria lævis, Sol.

Malaga; not uncommon.

Adelostoma sulcatum, Dup.

Gibraltar; in tufts and under stones; common. Specimens collected at Tetuan, Marocco, have the median carina of the head extending almost to the base; these are, no doubt, referable to *A. cristatum*, Eschsch., which, according to Haag, is merely a variety of *A. sulcatum*, Dup.

Stenosis hispanica, Sol.

Gibraltar; more local than the following, but abundant. Also at Djebel Mousa (Apes' Hill), and Tetuan, Marocco.

Stenosis hesperica, Sol.

Gibraltar; at roots of herbage, abundant. Also at Tetuan and Tangier.

Dichillus lævisculus, Kr.

Tangier; one example.†

Dichillus subcostatus, Sol.

Gibraltar; under bark, in the cork-woods.

Dichillus andalusicus, Rosenh.

Gibraltar; chiefly under stones, very common; Campo, &c. Neither this nor the preceding species were met with on the Maroccan side of the Straits, where they appear to be replaced by closely allied forms.

Elenophorus collaris, Linn.

Malaga; one example. Benzús Bay, Marocco; one example.

Morica planata, Fabr.

Gibraltar; North Front; locally very abundant. Also at Tangier and Tetuan.

Akis acuminata, Fabr.

Gibraltar; Rock, North Front, neutral ground, Campo, &c.; abundant.

Scaurus uncinus, Forst. (*gigas*, Waltl, *hespericus*, Sol.).

Gibraltar; neutral ground, &c.; not rare. Also at Tetuan.

Scaurus tristis, Oliv.*

Gibraltar. Also at Tetuan.

Scaurus sticticus, Gemm. (*punctatus*, Herbst).

Gibraltar; Rock, neutral ground, San Roque, &c.; common. Also at Benzús Bay and Tangier.

Blaps lusitanica, Herbst.

Benzús Bay and Tangier, Marocco. Numerous examples of both sexes of a large *Blaps* resembling *B. gages* seem to belong to this species, from European specimens of which the males differ in being a little less convex and more elongate. Three of these specimens (two males

† This species is not included in the last edition of the European Catalogue (1891); I, however, possess a specimen of it from Cartagena.

and one female) have the entire upper surface very opaque; they were collected at Benzús Bay with others which have the upper surface slightly shining, and I have very little doubt they are merely a variety of the same species. The males of both forms are without the characteristic tuft of fulvous hairs between the first and second ventral segments; the only other large species mentioned by Allard in his monograph (Ann. Soc. Ent. Fr., 1880—1882) as possessing this character being *B. caudigera*, Gemm., which, however, is a larger and broader insect. The caudal appendages are formed exactly as in *B. lusitanica*, long in the male, shorter in the female, and scarcely dehiscent at the apex. The posterior femora are denticulate and the tibiæ of the same pair of legs are slightly sinuous in the male. M. Allard has examined one of the opaque females, and states that the species is unknown to him.

Blaps gages, Linn.

Tangier; one male example.

Blaps armeniaca, Fald. (*plana*, Sol.).

Gibraltar; not uncommon. To judge from Allard's description and figure (Ann. Soc. Ent. Fr., 1881, p. 171, fig. 48), and from comparison with numerous specimens so named by him, the commonest *Blaps* at Gibraltar is referable to *B. armeniaca*, Fald., and not to *B. gages*, Linn.

Blaps hispanica, Sol.

Gibraltar; North Front; not uncommon. All the specimens are comparatively small in size.

Blaps brachyura, Küst.

Gibraltar; North Front. Female examples only obtained, two of which have been thus determined by M. Allard.

Blaps similis, Latr. (*fatidica*, St.).

Gibraltar; one example.

Asida holosericea, Germ. (*Ramburi*, Sol.).

Malaga.

Asida luctuosa, Rosenh.

Gibraltar; occasionally found on paths in the spring.

Asida Kraatzi, All.

Of this species two specimens were captured on Peregil Island, on the Maroccan coast. Allard's examples came from Tetuan.

Asida inquinata, Rosenh.

Gibraltar; found in tufts and under stones; not rare. Also at Tetuan and Tangier.

Asida Goudoti, Sol., var. *ventricosa*, Sol.

Gibraltar; one dead specimen in the second pine-wood.

Asida barbara, All.

Benzús Bay, Marocco; one example.

Asida cincta, Rosenh.

Malaga; not rare.

Asida rugosa, Fabr. (*Fabricii*, All.).

Tangier; not uncommon.

Pimelia variolosa, Sol.

Gibraltar; on the Rock, &c.; not rare.

Pimelia maura, Sol.

Gibraltar; chiefly beyond San Roque; not rare. Also at Ceuta, Tetuan, and Tangier.

Pimelia ruida, Sol.

Malaga. Also occurs at Almeria.

Pimelia fornicata, Herbst.

Gibraltar; North Front, neutral ground, &c.; common. Also at Tangier.

Pimelia Boyeri, Sol.

Tangier; two specimens.

Pimelia scabrosa, Sol.

Tetuan, Marocco; a few examples. Not met with at Gibraltar, but it is recorded from Spain.

Sepidium bidentatum, Sol.

Gibraltar; cork-woods and on the Rock, in spring; not common. Malaga; abundant.

Sepidium barbarum, Sol.

Tangier; one specimen. Recorded from Europe.

Crypticus gibbulus, Quens.

Gibraltar; North Front, neutral ground, &c.; common. Also at Tangier and Benzús Bay, Marocco.

Crypticus pruinosus, Duf.

Gibraltar; sandy beaches, at roots of plants; common. Not met with on the Maroccan coast.

Oochrotus unicolor, Luc.

Gibraltar; in nests of *Atta barbara*; abundant. Also at Tangier.

Dendarus pectoralis, Muls.*

Gibraltar; three examples. Also at Tetuan, Benzús Bay, and Tangier, Marocco.

Dendarus castilianus, Pioch.*

Gibraltar; not uncommon. Chiefly found under bark. These specimens differ from *D. pectoralis* in having the elytral interstices more or less convex, and the sides of the thorax less abruptly constricted behind, thus agreeing with Piochard's description. Rosenhauer does not mention either of these species, the only *Dendarus* (*Pandarus*) recorded by him being *D. Aubei*, Muls., an insect not met with by Mr. Walker.

Dendarus insidiosus, Muls.*

Gibraltar; not uncommon. Also at Tangier.

Phylax littoralis, Muls.*

Gibraltar; one specimen only.

Litoborus planicollis, Waltl.

Gibraltar; under stones, &c.; not rare.

Litoborus Moreleti, Luc.*

Tetuan, Marocco. A single specimen from Gibraltar seems to belong to the same species.

Micrositus furvus, Muls.*

Malaga; common.

Micrositus obesus, Waltl (*bæticus*, Muls.).

Gibraltar; in the cork-woods; rare. Also at Malaga.

Isocerus ferrugineus, Fabr.

Gibraltar; at roots of herbage on the beach; common. Also at Tetuan and Tangier.

Heliopathes cribratostriatus, Muls.

Tangier; a few examples. Not met with on the European side of the Straits; the species, however, has been recorded from Spain.

Heliopathes interstitialis, Muls.

Djebel Mousa (Apes' Hill) and Tetuan, Marocco; not uncommon.

Heliopathes emarginatus, Fabr. (*variolosus*, Luc.).*

Gibraltar; not uncommon. These examples seem to agree better with Mulsant's description of *H. emarginatus* than with his definition of any other species of the genus; the determination, however, is doubtful. Rosenhauer and Dieck both record *H. ibericus*, Muls., from Algeciras; Mr. Walker's examples, however, do not fit Mulsant's description of that species, nor do they agree with a specimen of *H. ibericus* forwarded to me for comparison by Herr E. Reitter.

Heliopathes (*Olocrates*) *planiusculus*, Muls.

Gibraltar; rare. Also, commonly, at Peregil Island and Tangier, Marocco.

Heliopathes (*Olocrates*) *latipennis*, n. sp.

Moderately elongate, rather convex, dull black; the head very densely and rugosely punctured, the eyes completely divided by the genæ; the prothorax broader than long, transversely convex, semicircularly emarginate in front, finely margined at the sides and base, moderately rounded at the sides anteriorly, gradually narrowed posteriorly, and subparallel at the extreme base, the hind angles prominent, rectangular or a little projecting, the entire surface very densely and uniformly punctured, and with traces of a smooth median line; the elytra distinctly wider than the prothorax, convex, moderately long, widest about the middle, parallel towards the base, with the humeri projecting in front and excavate within for the reception of the hind angles of the prothorax, finely striate, the striæ with rather coarse not very closely placed punctures, the interstices thickly and minutely punctured, feebly convex; legs stout, the anterior tibiæ triangularly dilated, but not very broadly so, the anterior tarsi simple. Length 9—10, breadth 4—4½, millim.

Tetuan, Marocco. Three examples, their sex not ascertained.

Closely allied to *H. planiusculus*, Muls., but duller, less elongate, and more convex; the head and thorax less finely punctured; the thorax a little broader at the base, and not so strongly constricted at the sides behind; the elytra very distinctly broader than the thorax, more coarsely punctate-striate, the interstices very feebly but distinctly convex; the anterior tibiæ less widened towards the apex. In the prominent humeri this species approaches the genus *Phylax*, but it is evidently better placed in the *Olocrates* section of *Heliopathes*; it agrees, in fact, in most of its characters, with *H. planiusculus*, which is one of those species with the anterior tarsi undilated in the male. The form of the humeri separates it from *Micrositus*, and that of the anterior tibiæ from *Litoborus*.

Pseudolamus pusillus, Baudi (*seriatoporus*, Fairm.).*

Gibraltar; in tufts of grass, &c., Campo Common; rare. Also commonly at Tangier, and rarely at Tetuan.

Scleron armatum, Waltl.

Gibraltar; in tufts of grass, &c., Campo; abundant. Also at Tetuan.

Cnemeplatia atropos, Costa.*

Gibraltar; chiefly on walls, late summer; common. Also at Tangier.

Opatrum porcatum, Fabr.

Djebel Mousa (Apes' Hill), Tetuan, and Tangier; not uncommon. Recorded from the Balearic Islands and Sicily.

Opatrum bæticum, Rosenh.

Malaga; common.

Opatrum (*Gonocephalum*) *rusticum*, Oliv.

Gibraltar; under stones, North Front, &c.; common. Also at Tetuan. Possibly this is the *O. lugens* of Dieck.

Opatrum (*Gonocephalum*) *pusillum*, Fabr.

Gibraltar; in tufts of grass, &c., Campo and other places; not rare. Also at Tangier.

Opatroides thoracicus, Rosenh.

Gibraltar; under stones, not rare. Also at Tangier.

Leichenum pulchellum, Küst.

Gibraltar; sandy places, not common. Also at Tetuan.

Anemia granulata, Lap., var. *sardoa*, Géné.*

Gibraltar; on the North Front road, common, in summer.

Ammophthorus rufus, Luc. (*rugosus*, Rosenh.).

Gibraltar; sandy places, at roots of herbage; common. Also at Tetuan.

Trachyscelis aphodioides, Latr.*

Gibraltar; eastern beach, not common. Also at Tetuan.

Phaleria oblonga, Küst.

Gibraltar; at the roots of herbage and under carcases on the beach; common. Also at Tetuan.

Phaleria cadaverina, Fabr.

Tangier; not met with at Gibraltar. Recorded by Rosenhauer from Malaga.

Alphitophagus 4-pustulatus, Steph.

Gibraltar; one specimen found beneath decaying fig-bark on the Rock.

Pentaphyllus testaceus, Hellw.*

Gibraltar; in dead locust tree, Alameda; abundant.

Tribolium ferrugineum, Fabr.

Gibraltar; occasionally on walls.

Gnathocerus cornutus, Fabr.

Gibraltar; on walls.

Palorus melinus, Herbst (*depressus*, Fabr.).*

Gibraltar; plentifully in a dead oak, at the edge of the second pine-wood.

Corticeus fasciatus, Fabr.*

Gibraltar; plentifully in a dead oak, at the edge of the second pine-wood.

Alphitobius diaperinus, Panz.

Gibraltar.

Cataphronetis crenata, Germ.

Tetuan; not uncommon. Not met with at Gibraltar. Recorded by Rosenhauer from Cadiz.

Cossyphus Hoffmannseggi, Herbst.

Gibraltar; very plentifully under stones near Campo. Also at Peregil Island, Djebel Mousa (Apes' Hill), Tetuan, and Tangier.

Cossyphus Dejeani, de Brême.

Gibraltar; under same conditions as the preceding; plentiful. Also at Tetuan and Tangier.

Cossyphus incostatus, de Brême.

Algeciras; under stones, clay soil; common. Also at Djebel Mousa (Apes' Hill), Marocco. Recorded by Dieck from Tangier.

Cossyphus tuberculatus, de Brême.

Recorded by Rosenhauer from Algeciras. Only met with on the Maroccan side, at Tangier.

Cossyphus pygmæus, de Brême.*

Algeciras; under stones, common, March 16th, 1889. Also plentifully at Tangier.

Tenebrio obscurus, Fabr.

Gibraltar; picked up in the town.

Calcar elongatum, Herbst.

Gibraltar; under stones, &c., Campo; abundant. Also freely at Tetuan and Tangier.

Calcar humerale, n. sp.

Smaller and less elongate than *C. elongatum;* the upper surface more opaque; the eyes still smaller, transverse, distant from the base of the head; the head and prothorax a little more finely and shallowly punctured; the prothorax with the sides parallel in their median third, rounded in front, and obliquely converging just before the base, the hind angles well defined; the elytra relatively much shorter than in *C. elongatum*, not or barely exceeding twice the length of the prothorax, the striæ deeper and more finely, shallowly, and more closely crenate-punctate, the interstices moderately convex on the disc, strongly so towards the sides, and sparsely and minutely punctured, the lateral carina sharper and extending right up to the base (visible from above), the humeri considerably prolonged in front and subtuberculiform, the sides almost parallel at the base; the legs shorter than in *C. elongatum;* the anterior tibiæ bent inwards at the apex (the intermediate pair

also, but less distinctly so), the posterior tibiæ very feebly dilated on the inner side within about the middle, and all the femora a little more swollen, in the male; the other characters very much as in *C. elongatum*. Length 7¼—7½ millim. (♂ ♀).

One female and two male examples, all from Tangier. Abundantly distinct from *C. elongatum* in numerous particulars, more especially by the very prominent subtuberculiform humeri, the relatively much shorter elytra (in *C. elongatum* they are considerably more than twice the length of the thorax), these being almost parallel at the base, the distinct hind angles to the thorax, the more convex elytral interstices, and the deeper and more finely punctured striæ. The very small, narrow, transverse eyes, which are distant from the base of the head, separate *C. humerale* at once from all the species of the section *Centorus*, Muls., of which two, *C. Lucasi*, Muls., and *C. Raffrayi*, Fairm., have been described from Algeria. *C. elongatum* is a common species at Tangier, and the two were apparently collected together. *Centorus procerus*, Muls., is recorded by Rosenhauer from Algeciras.

Boromorphus tagenioides, Luc.

Gibraltar; in dry tufts of grass and under stones; abundant. Also at Tangier and Tetuan.

Dilamus rufipes, Luc.*

Gibraltar; beyond San Roque, a few under stones, &c., March, 1888. Also at Tangier; common.

Misolampus Goudoti, Guér.

Djebel Mousa (Apes' Hill) and Ceuta, Marocco; under loose bark. Not met with on the opposite side of the Straits, but recorded from Europe.

Helops coriaceus, Küst.

Gibraltar; under loose cork-bark, cork-woods; sparingly.

Helops (*Nalassus*) *pallidus*, Curt.*

Gibraltar; chiefly on the east beach at roots of herbage; not rare. Recorded by Dieck from Gibraltar and Tangier.

Helops (*Nalassus*) *nanus*, Küst. (*parvulus*, Luc.).

Gibraltar; under stones, in tufts of grass, flood refuse, &c.; occasional. Also at Tetuan.

Helops (*Nalassus*) *parvulus*, Ramb.

Gibraltar; one mutilated example, perhaps belonging to this species.

Helops (*Nalassus*) *tingitanus*, All.

Tetuan; three examples.

Helops (*Stenomax*) *calpensis*, n. sp.*

Oblong-ovate, moderately convex, blackish brown, shining, the elytra with a very faint brassy lustre, the labrum and oral organs fusco-testaceous. Head deeply transversely depressed in front, very closely and finely punctured; antennæ fusco-ferruginous, rather slender, in the male reaching to about the basal fourth of the elytra, in the female a little shorter; prothorax strongly transverse, transversely convex, scarcely broader at the base than at the apex, the base and apex feebly bisinuate, the sides finely margined, rounded and dilated before the middle (less distinctly so in the female), narrowed and slightly sinuate behind, the hind angles subrectangular, the basal foveæ feebly indicated, the surface closely, finely, and almost equally punctured (the punctuation a little more diffuse than that of the head, and not becoming denser towards the sides); scutellum with a few minute punctures; elytra a little flattened on the disc, not more than two and a half times the length of the prothorax, and scarcely wider than it at the base, widest at the middle, a little rounded at the sides, obliquely narrowed behind, deeply and finely punctate-striate, the striæ becoming finer towards the apex, the interstices feebly convex, minutely and rather thickly punctured; beneath pitchy-brown, finely and thickly punctured; legs pitchy-brown, the tarsi testaceous; the anterior tarsi only a very little stouter in the male than in the female; body apterous. Length $7\frac{1}{2}$, breadth 3, millim. (♂ ♀).

Two examples only, both from the vicinity of Gibraltar. Somewhat resembling *H.* (*Omaleis*) *ophonoides*, Luc.; but with the elytra relatively much shorter (in *H. ophonoides* they are fully three times as long as the thorax), less parallel, very little wider than the thorax at

the base, and the striæ more finely punctured; the thorax more convex transversely, more rounded at the sides anteriorly (in *H. ophonoides* the sides are slightly sinuate-emarginate before the apex), and with the anterior angles more declivous and less prominent; also much smaller in size. The male differs from the female in having the anterior tarsi slightly stouter, the thorax rather broader and more rounded at the sides before the middle, the elytra a little narrower, and the antennæ longer. M. Allard, to whom an example has been submitted for examination, states that the species is unknown to him. *H. ophonoides* is recorded by Dieck from Algeciras.

Helops (*Catomus*) *Walkeri*, n. sp.*

Elongate, narrow, convex, brownish-piceous or obscure reddish-brown, with an æneous lustre, slightly shining, the oral organs, antennæ, and legs reddish-brown, the upper surface thickly clothed with long erect yellowish-cinereous pubescence. Head very deeply transversely depressed in front, coarsely and densely punctured; antennæ thin at the base, but thickening outwardly, extending to beyond the middle of the elytra in the male, considerably shorter in the female; prothorax convex, distinctly wider than the head in both sexes, very little broader than long in the male, more transverse in the female, rounded at the sides anteriorly, obliquely narrowed behind, the hind angles subrectangular, the base truncate, the entire surface densely and coarsely punctured, the punctures oblong in shape, and here and there obliquely or longitudinally confluent (more distinctly so in some specimens than in others); scutellum short, more than twice as broad as long, smooth, or with a few fine scattered punctures; elytra distinctly wider than the prothorax at the base, long and convex, widest at the middle, slightly rounded at the sides and narrowed at the shoulders, very sharply margined from the base to the apex, truncate at the base, the humeri distinctly projecting in front, the basal margin somewhat swollen, finely and deeply striate throughout, the striæ with fine oblong closely placed punctures, the interstices feebly convex or almost flat, coarsely punctured, the punctures on each interstice forming irregular double rows in the larger specimens, and a single row in the smaller ones; beneath paler in colour, coarsely and closely punctured; anterior tarsi with the three basal joints very broadly and equally dilated in the male. Length 4—7½, breadth 1½—2¾, millim. (♂ ♀).

Gibraltar; not uncommon, in tufts of grass, &c. Specimens of this species submitted by me to M. Allard have been named by him as *H. gossypiatus*, Reiche, an insect only known as yet from Algeria. These Gibraltar specimens, however, by no means agree with either Reiche's original description, or with the subsequent one given by Allard (Mittheil. schweiz. ent. Ges., v., p. 191). Both authors state that "*H. gossypiatus* may be easily distinguished by its almost cylindrical form, its prothorax scarcely broader than the head, and its hairy clothing." In the last-mentioned character *H. Walkeri* agrees with *H. gossypiatus;* but its general shape is less cylindrical, and the prothorax in both sexes is very distinctly wider than the head. In various other particulars it also differs from the description: the elytral interstices are coarsely (not finely) punctured, the elytra themselves are distinctly broader at the base than the prothorax, the scutellum is almost smooth, &c. *H. Walkeri* is nearly allied to *H. macellus*, Kr., an insect inhabiting the same locality; but is easily separable from it by the long pubescence, the very much more finely punctured elytral striæ, the flatter and coarsely punctured interstices, &c. Like many other species of the genus, it varies enormously in size. The male has the three basal joints of the anterior tarsi very broadly and equally dilated, these joints being as wide as the tibiæ at the apex. It differs in various particulars from *H. piligerus*, Kr., *H. villosipennis*, Luc., *H. pubescens*, Küst., &c.

Helops (*Catomus*) *macellus*, Kr.*

Gibraltar; under stones, in tufts of grass, flood refuse, &c.; occasional. Recorded by Dieck from Algeciras.

Helops (*Catomus*) *angustatus*, Luc.

Tetuan and Tangier; several examples, varying enormously in size. Not yet known from Europe.

Helops (*Diastixus*) *carbo*, Küst.*

Gibraltar; five examples. The determination is made upon M. Allard's authority. These specimens seem

to agree better with the description of the Algerian *H. puncticollis*, Luc., than with that of *H. carbo*, Küst.; from an Algerian example of the former before me they merely differ in having the thorax more sparsely and finely punctured on the disc.

Helops (*Nesotes*) *tuberculipennis*, Luc.*

Gibraltar; a few specimens. Rather commonly at Tetuan and Tangier. In some of the Gibraltar examples the upper surface is of a more shining and more bronzy tint than in those from Marocco, others again are very dull black; the punctures of the elytral striæ are also coarser in some specimens than in others. One example, from Tetuan, has the thorax much less transverse than usual; the elytra in all exhibit the characteristic tuberculate apical interstices. An addition to the European list.

CISTELIDÆ.

Isomira ovulum, Kies.* (*acuminata*, Fairm.).

Gibraltar; Rock, &c., not uncommon; chiefly on the blossom of *Chamærops*. Previously recorded from Gibraltar by Crotch (Petites Nouv. Ent., i., p. 49) under the name of *I. acuminipennis*, and by v. Heyden (Berl. ent. Zeitschr., 1870, Beih., p. 144). *I. acuminata*, Fairm., from Tangier, Marocco (specimens of which are before me), is, no doubt, synonymous with *I. ovulum*.

Isomira murina, Linn.

Gibraltar; by sweeping near San Roque; scarce. These examples have the thorax fusco-ferruginous.

Omophlus ruficollis, Fabr.

Gibraltar and Malaga; on flowers in spring and early summer; abundant.

Omophlus abdominalis, Lap.

Benzús Bay and Tangier, Marocco; not uncommon.

Omophlus rufiventris, Waltl.

Gibraltar; chiefly on thistles, early summer; common. Apparently replaces *O. abdominalis* on the Europeau

side of the Straits; the latter, however, is recorded from Spain.

LAGRIIDÆ.

Lagria viridipennis, Fabr.

Tetuan, Marocco; abundant. This species seems to be restricted to the African side of the Straits.

Lagria Grenieri (Bris.), Kies.*

Gibraltar; Rock, on walls, &c., and on the wing; not rare. Kiesenwetter's description of *L. Grenieri*, Bris. (Berl. ent. Zeitschr., 1870, Beih., p. 145), agrees with these specimens. A single male example collected by Mr. Walker at Malaga, apparently a variety of the same species, has the thorax broader, and the elytra less coarsely wrinkled.

Lagria hirta, Linn.

Gibraltar; scarce.

Lagria lata, Fabr.

Gibraltar; one male example only. This has the antennæ much less elongate than in the same sex of *L. Grenieri*, and the thorax almost smooth.

PEDILIDÆ.

Scraptia dubia, Oliv. (*fusca*, Latr.).

Gibraltar; on the Rock, and also near Algeciras; a few specimens by sweeping.

Scraptia fuscula, Müll. (*minuta*, Muls.).*

Gibraltar; under dry bark, cork-woods, May, 1888; one example.

Scraptia ophthalmica, Muls.*

Gibraltar; Rock, &c., not uncommon, on flowers. Also at Tangier. Apparently not hitherto recorded from Spain. Mulsant gives France; Reitter (Deutsche ent. Zeitschr., 1889, p. 268), Corsica and Sicily. The head of this species is figured by Reitter (Wien. ent. Zeit., 1883, t. 4, fig. 5).

XYLOPHILIDÆ.

Xylophilus boleti, Marsh.

Gibraltar; in dead sticks, &c., on the Rock; scarce. Also at Tetuan.

Xylophilus nigripennis, Villa (*neglectus*, Duv.).

Tetuan, Marocco; one example, apparently belonging to this species.

Xylophilus sanguinolentus, Kies.*

Malaga; two examples, one of each sex.

PYTHIDÆ.

Rhinosimus planirostris, Fabr.*

Gibraltar; one specimen, Linea.

ANTHICIDÆ.

Notoxus monoceros, Linn.*

Gibraltar; Campo, &c.; chiefly on the wing.

Notoxus cornutus, Fabr.

Gibraltar; on sallow bushes, first pine-wood, July, 1888; not rare.

Formicomus pedestris, Rossi.

Gibraltar; in tufts of grass, flood refuse, &c.; not rare. Also at Tetuan and Tangier.

Formicomus canaliculatus, La Ferté.

Tetuan and Tangier; not rare. Recorded from Europe.

Amblyderus scabricollis, La Ferté.

Tetuan; two examples only. Not met with on the European side, but recorded from Spain.

Tomoderus compressicollis, Motsch.

Tetuan; many examples. Recorded from Europe.

Anthicus Rodriguesi, Latr.

Gibraltar; in tufts of grass, Campo Common, &c.; not rare. Also at Tangier and Tetuan.

Anthicus antherinus, Linn.

Gibraltar; in tufts of grass, on walls, &c.; common.

Anthicus quadriguttatus, Rossi.

Gibraltar; neutral ground, Campo, &c.; common. Also at Tangier and Tetuan.

Anthicus hispidus, Rossi.

Gibraltar; in company (as usual) with the preceding, but much less common.

Anthicus instabilis, Schmidt.

Gibraltar; in flood refuse, &c.; common. Also at Tetuan and Tangier.

Anthicus Ghiliani, La Ferté.

Gibraltar; rare. Five examples only.

Anthicus humilis, Germ.

Gibraltar; in flood refuse, &c.; common. Also at Tetuan, Ceuta, and Tangier, Marocco.

Anthicus minutus, La Ferté.

Gibraltar; in tufts, on walls, &c. Also at Tetuan.

Anthicus blandulus, Baudi.*

Gibraltar; a few examples. Also at Tetuan. These differ from *A. minutus* (of which it is treated as a variety by Marseul) in the closely punctured head, thus agreeing with Reitter's remarks (*cf.* Wien. ent. Zeit., 1884, p. 144).

Anthicus fenestratus, Schmidt.

Gibraltar; at roots of herbage, sandy places, Linea, &c. Also at Tangier.

Anthicus floralis, Fabr.

Gibraltar; on walls, &c. Also at Tangier.

Anthicus Brucki, Kies.*

Gibraltar; on yellow flowers, Rock, early summer; not uncommon. Only recorded as yet from Gibraltar (Kies., Berl. ent. Zeitschr., 1870, Beih., p. 147; Mars., Monogr. des Anthic. de l'Ancien Monde, L'Abeille, xvii., p. 133).

Anthicus tenellus, La Ferté.

Tetuan; a few examples. Occurs in Europe.

Anthicus tristis, Schmidt.*

Gibraltar; at roots of herbage in sandy places, on walls, &c.; common. Also at Tetuan.

Anthicus olivaceus, La Ferté.

Gibraltar; chiefly found on flowers; not uncommon.

Anthicus Genei, La Ferté.*

Gibraltar; one specimen, Campo beach, in flood rubbish.

Ochthenomus unifasciatus, Bon.

Gibraltar; in flood refuse, occasional. Also at Tetuan.

Ochthenomus tenuicollis, Rossi.

Gibraltar; in tufts of grass, &c.; rather common. Also at Tetuan.

MORDELLIDÆ.

Mordella sulcicauda, Muls.*

Gibraltar; on umbels, &c., early summer; common. Perhaps the *M. fasciata* of Rosenhauer.

Mordella bipunctata, Germ.*

Gibraltar; on umbels, &c., near San Roque; a few specimens. Also at Benzús Bay, Marocco.

Stenalia testacea, Fabr. (*brunneipennis*, Muls.).
Gibraltar; on umbels, first pine-wood; common.

Mordellistena brunnea, Fabr.*
Gibraltar; on *Cistus* flowers, first pine-wood; rare.

Mordellistena parvula, Gyll.*
Gibraltar; on flowers, &c., on the Rock.

Mordellistena micans, Germ. (*grisea*, Muls.).
Gibraltar; on umbels, &c.; a few specimens. Also at Benzús Bay, Marocco.

Mordellistena pumila, Gyll.
Gibraltar; on flowers, in the spring. Also at Tangier.

Mordellistena stenidea, Muls.*
Gibraltar; on flowers, &c.; not rare. Also at Tetuan.

Anaspis ruficollis, Fabr.*
Gibraltar; on flowers, common.

Anaspis pulicaria, Costa.*
Gibraltar; on flowers, common. Also at Tangier.

Anaspis subtestacea, Steph.*
Tetuan. One example.

Anaspis (*Larisia*) *Chevrolati*, Muls.*
Gibraltar; cork-woods, on dead timber; also on the Rock, on umbels. These specimens are apparently referable to *A. Chevrolati*, Muls., as defined by Emery. Also at Benzús Bay and Tetuan.

Anaspis (*Nassipa*) *labiata*, Costa.*
Gibraltar; on clover flowers, &c., Campo.

Anaspis (*Silaria*) *quadrimaculata*, Gyll.

Gibraltar; on umbels, &c., on the Rock, June; common. Also at Tetuan; one example. In the specimens from Gibraltar the thorax is black; in the one from Tetuan it is reddish testaceous.

RHIPIPHORIDÆ.

Evaniocera Dufouri, Latr.*

Gibraltar; one male example, captured on the wing in the cork-woods, May, 1888.

Emenadia præusta, Gebl.*

Gibraltar; Campo, one female specimen only, taken from a flower.

Emenadia flabellata, Fabr.*

Gibraltar; one male example, cork-woods.

MELOIDÆ.

Meloe tuccius, Rossi.

Gibraltar; on paths, occasional.

Meloe purpurascens, Germ.*

Gibraltar; on paths, &c., chiefly in winter; rare.

Meloe majalis, Linn.

Gibraltar; Campo Common, &c., in the spring; abundant.

Meloe murinus, Brandt.

Tangier; one example.

Meloe rugosus, Marsh.

Gibraltar; occasionally under stones, in winter. Also at Tetuan.

Meloe baudueri, Gren.*

Gibraltar; one example. According to Abeille de Perrin (Bull. Soc. Toulouse, 1880, p. 235), this species is widely distributed in the Mediterranean basin.

Meloe autumnalis, Oliv.

Djebel Mousa (Apes' Hill), Marocco; one example. A well-known European species.

Meloe violaceus, Marsh.

Tangier; a few examples.

Mylabris oleæ, Cast.

Tetuan and Tangier, Marocco. Apparently not recorded from Europe.

Mylabris variabilis, Pall.

Tetuan and Tangier, Marocco. A well-known European species.

Mylabris quadripunctata, Linn.

Gibraltar; on flowers, &c., chiefly in the cork-woods in early summer; common.

Mylabris hieracii, Graells (*suspiciosa*, Rosenh.).

Gibraltar; with the preceding.

Coryna billbergi, Gyll.

Gibraltar; with the preceding. In some specimens the two spots nearest the suture are obliterated.

Œnas fusicornis, Abeille de Perrin (♂ = *afer*, Duv., nec Linn.; ♀ = *hispanus*, Ab. de Per.).*

Gibraltar; near Algeciras and in first pine-wood, on umbels, numerous examples, including both sexes. The male agrees with Abeille de Perrin's description of *Œ. fusicornis*, and the female with his *Œ. hispanus;* the latter was described from a single female example, the former from the male sex only!

Œnas afer, Linn. (nec Duv.).

Benzús Bay, Marocco; a few specimens, including both sexes. They agree with Abeille de Perrin's de-

finition of this species (Bull. Soc. Toulouse, 1880, pp. 241, 243). Some examples collected at Tangier perhaps belong here (or to *Œ. sericea*, Oliv.); four of them have the thorax pitchy black, instead of rufous.

Lagorina sericea, Pall.

Gibraltar; occasionally found by sweeping, &c. Also at Tangier.

Zonitis præusta, Fabr.*

Gibraltar; Campo Common, &c., on flowers; not rare.

Zonitis mutica, Scriba.

Gibraltar; not uncommon.

Lydus algiricus, Latr.

Benzús Bay, Marocco. Recorded from Europe.

ŒDEMERIDÆ.

Asclera xanthoderes, Muls.*

Gibraltar; on *Cistus* flowers, cork-woods, three examples, March, 1888. Recorded by Mulsant from France and Sicily.

Nacerdes melanura, Linn.*

Gibraltar; on the wing at Linea and elsewhere.

Oncomera marmorata, Er.*

Gibraltar; one example flying in the Alameda at dusk, June, 1887, and two others subsequently. An addition to the European list.

Œdemera barbara, Fabr.

Gibraltar; on flowers, common, in spring.

Œdemera lurida, Marsh.

Gibraltar; on flowers, first pine-wood.

Œdemera unicolor, Schmidt.

Gibraltar; on flowers, in the spring; one female specimen only.

Œdemera simplex, Linn. (*flavimana*, Schmidt).*

Gibraltar; on flowers, &c.; not rare. Also at Malaga. This is probably Rosenhauer's *Œ. flavipennis*. It also occurs in Marocco.

Stenostoma cæruleum, Pet. (*rostratum*, Fabr.).

Tetuan, Marocco; plentifully in the marshy ground at Esmir. Recorded from Spain.

XV. *On a new species of* Prothoë. By Philip Crowley, F.L.S., F.Z.S., &c.

[Read July 1st, 1891.]

Plate XVIII.

A few months since I received from Tonghou, Burmah, a specimen of *Prothoë*, which I placed among my *Prothoë caledonia;* but upon further examination with the type, and also eight or ten other specimens from Perak, found that it differed to such an extent that I have ventured to describe it as a new species under the name of *Prothoë belisama*. The specimen in question came from the neighbourhood of Tonghou, which is some 1200 to 1500 miles north of Perak, or Borneo, from whence, I believe, the type came. I append a description, and give a plate of *belisama*, which is in my own collection.

Prothoë belisama, Crowley.

Nearest to *P. caledonia*, Hewitson, but is easily distinguished by the large extent of yellow on the fore wing, and the dark border on the hind wing being very much narrower. Upper side :—*Fore wing :* The yellow patch is rather paler in colour, and extends up to the third median nervule, the edges of which are more dentated than in *P. caledonia*. At the posterior angle the yellow almost unites with the hind marginal border. The dark colour on the costa, apical portion, and hind margin, though somewhat lighter in colour, is relieved by five very distinct yellow spots, there being an additional one below these, on the costa, but near the base. *Hind wing:* The border on the hind margin is very much narrower, which entirely disappears below the second median nervule, towards the anal angle. The basal area is pale mauve, the grey being rather pinker than in the allied species. Under side :—*Fore wing :* Both wings rather paler, both in ground colour and markings, especially the red beyond the discoidal cell. The black bars between the third median nervule and the second discoidal or radial nervule is wider apart, which reduces the red on

either side to a mere spot. The large black spot at the posterior angle is much smaller in size, and not so dark in colour. *Hind wing:* The black spots at the base are larger, those above the costal and subcostal nervules being more elongated. The white band which crosses the wing from the end of the costal nervure to the base is paler and slightly broader. The broad green submarginal border has entirely disappeared, with the exception of two tiny spots, one between the first and second subcostal nervules, and the other between the first and second median nervules. The line which also edges this green border is missing, the only indication being a small red spot between the first and second subcostal nervules. Exp. 4½ in.

Hab. Tonghou.

Explanation of Plate XVIII.

Fig. 1. *Prothoë belisama*, Crowley.
2. Under side of ditto.

XVI. *Notes on the Orthopterous family* Mecopodidæ. By William F. Kirby, F.L.S., Assistant in the Zoological Department, British Museum.

[Read July 1st, 1891.]

The small family *Mecopodidæ* forms a very natural group among the *Phasgonuridæ*, or grasshoppers with long antennæ, which are usually, but improperly, called *Locustidæ* by entomologists, as the name *Locustidæ* should certainly be retained for the large migratory species with short antennæ, of which *Locusta migratoria*, L., is the type.

The *Mecopodidæ* are inhabitants of the warmer parts of Asia and Africa, and may easily be recognised by a few salient characters :—

Prosternum bispinose.

All the tibiæ with terminal spines above on each side.

Front tibiæ with open foramina on each side.

Tarsi with the joints broad, depressed and laterally carinated.

Hind legs very long.

Karsch has published a synopsis of the family in Berl. Ent. Zeitschr., xxx., pp. 107—118), which may be consulted with advantage.

Genus I. Macrolyristes.

Vollenhoven, Tijdschr. Ent., viii., p. 106 (1865).

1. *Macrolyristes imperator.*

Vollenhoven (nec Walker), *l. c.*, p. 108, pl. vii. (1865)

Hab. Java, Borneo. B. M.

A very large and handsome species, with strongly serrated lateral borders to the pronotum.

Genus II. Mecopoda.

Serville, Hist. Nat. Ins. Orth., p. 532 (1839).

Lucera, *Walk.*, Cat. Derm. Salt. B. M., ii., p. 265 (1869), *immature*.

2. *Mecopoda elongata.*

Gryllus elongatus, Linn., Syst. Nat., i., p. 429, n. 26 (1758): Mus. Ulr., p. 127 (1764).
Mecopoda elongata, Walk., Cat. Derm. Salt., iii., p. 457, n. 1 (1870).
M. rufa, Walk., *l. c.*, p. 458, n. 3 (1870), *nec Stoll.*
Decticus pallidus, Walk., *l. c.*, ii., p. 262, n. 34 (1869), *immature*.
D. tenebrosus, Walk., *l. c.*, p. 263, n. 35 (1869).
Lucera bicoloripes, Walk., *l. c.*, p. 265, n. 1 (1869), *immature*.

Hab. India, China (north to the Corea), Ceylon, Philippines, Borneo, &c. B. M.

A very common and widely distributed species. The full synonymy is given by Walker (iii., p. 457), and is therefore not here repeated. Walker's *Mecopoda rufa* appears to be only a bleached specimen of *M. elongata*. He quotes (doubtfully, it is true) a figure of Stoll's (Saut. et Grill., pl. 9, f. 37), which does not appear to me to belong to the *Mecopodidæ* at all.

3. *Mecopoda cyrtoscelis.*

Karsch, Ent. Nachr., xiv., p. 146 (1888).

Hab. "Segaar Bay" (*Karsch*).

4. *Mecopoda lamellata.*

Gryllus lamellata, Linn., Syst. Nat., i., p. 429, n. 29 (1758).
Gryllus lamellosus, Linn., Mus. Ulr., p. 128 (1764).
Mecopoda lamellosa, Stål, Rec. Orth., ii., p. 48 (1874).

Hab. Sierra Leone. B. M.

There is only a single male in the British Museum collection, which appears to agree with Stål's description, though whether it is identical with the Linnean

species may be open to question. In the absence of a series of *M. lamellata* it is better to regard *M. latipennis*, Burm., as provisionally distinct.

5. *Mecopoda latipennis.*

Burm., Handb. Ent., ii., p. 686, n. 2 (1839).

Hab. Natal. B. M.

All the specimens in the British Museum are rather larger than Burmeister's type. The male has green or brown tegmina; the female has brown tegmina, with a longitudinal row of black spots, bordered outside with white, and followed by some detached whitish markings.

6. *Mecopoda frontalis.*

Mecopoda frontalis, Walk., Cat. Derm. Salt., v., p. 48 (1871).

M. monroviana, Karsch, Berl. Ent. Zeitschr., xxx., p. 112, pl. iii., fig. 4 (1886).

Hab. Monrovia (*Karsch*); Sierra Leone. B. M.

A very dark-coloured species.

7. *Mecopoda walkeri*, sp. n.

Mecopoda imperator, Walk., Cat. Derm. Salt., iii., p. 458, n. 4 (1874).

Hab. Philippines. B. M.

A true *Mecopoda*, but with broader tegmina than the other species. It has nothing to do with the genus *Macrolyristes.*

8. *Mecopoda platyphæa.*

Walk., Cat. Derm. Salt., iii., p. 458, n. 5 (1870).

Hab. Ceylon. B. M.

One pair. The tegmina are green in the male, and brown in the female.

9. *Mecopoda karschi*, sp. n.

Male. Dark chocolate-brown, indistinctly mottled with paler and darker. Head with pale carinæ in front of and between the eyes; behind these are two pale spots adjoining each eye, the

hindermost reaching the occiput. A large reddish frontal ocellus on the face between the lower borders of the eyes. Antennæ chocolate-brown towards the base, black beyond, with pale rings at more or less regular intervals. Pronotum chocolate-brown, rugose-punctate, with two rather deep incisions on each side, the lateral carinæ bordered with pale, especially in front. Tegmina brown, with one or two pale blotches about the middle, and some small scattered pale dots. Wings fusco-hyaline, marked with brown at the tips. Legs varied with rufous-brown, femora darker. Four front femora unarmed, their tibiæ with very fine spines; hind femora strongly thickened, with some small spines at the base above. Six spines on the outside; those on the inside rather larger, and more numerous, extending further towards the base. Cerci thick, curved inwards, nearly as long as the subgenital plate, which is triangularly emarginate at the extremity. Long. corp. 25 millim.; al. ant. long. 40; lat. 10; al. post. long. 39; lat. 17 millim.; fem. post. 43 millim.; tib. post. 38 millim.

Hab. Queensland. B. M.

A small species, with rather long, narrow, and pointed wings and tegmina.

10. *Mecopoda regina*, sp. n.

Female. Brown; head behind the eyes above, and below them, pale; pronotum deeply incised on each side, and its front lobe with a slight additional indentation on each side. Hind lobe almost rectangular at the sides, and slightly bordered with paler. Antennæ blackish, with pale rings at regular intervals, those towards the base narrowest. Tegmina brown, irregularly varied with pale grey, rather narrow towards the base, wider beyond the middle, the apex somewhat pointed. Wings rather narrow, fusco-hyaline. Front legs wanting; middle femora unarmed; middle tibiæ with two rows of small spines beneath, and a single row on the upper surface. Hind femora much thickened at the base, with several strong yellowish tubercles above, on and within the central carina; beneath, an outward row of small tubercles, and an inner row of short spines. Hind tibiæ with a double row of short strong spines on the upper surface, and a few small ones at long intervals beneath, on the hinder two-thirds of the tibiæ. Long. corp. cum ovipos. 59 millim.; ovip. 23; al. ant. long. 65; lat. 16; al. post. long. 63; lat. 28; fem. post. 56 millim.; tib. post. 55 millim.

Hab. Duke of York Island. B. M.

Much resembles the description of *M. cyrtoscelis*,

Karsch; but, apart from the difference in locality, the latter appears to be a larger and much more strongly spined insect.

Genus III. Pachysmopoda.

Karsch, Berl. Ent. Zeitschr., xxx., p. 108 (1886).

11. *Pachysmopoda abbreviata.*

Mecopoda abbreviata, Taschenberg, Zeitschr f. Naturw., lvi., p. 184 (1883).

M. (*Pachysmopoda*) *abbreviata*, Karsch, Berl. Ent. Zeitschr., xxx., p. 114, pl. iv., f. 2 (1886).

Hab. Socotra. B. M.

Genus IV. Euthypoda.

Karsch, Berl. Ent. Zeitschr., xxx, p. 108 (1886).

Macroscirtus, *Pictet*, Mém. Soc. Généve, xxx. (6), p. 13 (1888).

12. *Euthypoda acutipennis.*

Mecopoda (*Euthypoda*) *acutipennis*, Karsch, Berl. Ent. Zeitschr., xxx., p. 116, pl. iv., f. 3 (1886).

Hab. Chinchoxa.

13. *Euthypoda kanguroo.*

Macroscirtus kanguroo, Pictet, Mém. Soc. Généve, xxx., p. 14, pl. ii., f. 38, 38*a* (1888).

Hab. Gaboon (*Pictet*); Ashanti. B. M.

14. *Euthypoda granulosa.*

Mecopoda (*Euthypoda*) *granulosa*, Karsch, Ent. Nachr., xii., p. 317 (1886).

Hab. West Africa, between Kuako and Kimpoko.

15. *Euthypoda inalata.*

Mecopoda (*Euthypoda*) *inalata*, Karsch, Berl. Ent. Zeitschr., xxx., p. 117 (1886).

Hab. Chinchoxo; and between Kuako and Kimpoko.

16. *Euthypoda unguiculata.*

Mecopoda (*Euthypoda*) *unguiculata*, Karsch, Ent. Nachr., xiv., p. 147 (1888).

Hab. Usambara.

Genus V. Vetralia.

Walk., Cat. Derm. Salt., ii., p. 391 (1869).

17. *Vetralia quadrata.*

Vetralia quadrata, Walk., Cat. Derm. Salt., ii., p. 392, n. 1 (1869).

Mecopoda (*Euthypoda*) *difformis*, Karsch, Berl. Ent. Zeitschr., xxx., p. 115, pl. iv., f. 1 (1886).

Hab. Ceylon. B. M.

Genus VI. Acridoxena.

Acridoxena, *White*, Proc. R. Phys. Soc. Edinb., iii., p. 309 (1865).

‖ Stalia, *Scudd.*, Proc. Bost. Soc. N. H., xvii., p. 454 (1875).

Eustalia, *Scudd.*, *l. c.*, xx., p. 95 (1879).

18. *Acridoxena hewaniana.*

Acridoxena hewaniana, Smith, Proc. R. Phys. Soc. Edinb., iii., p. 310 (1865).

Stalia foliata, Scudd., Proc. Bost. Soc. N. H., xvii., pp. 456, 457, figs. (1875).

Eustalia foliata, Scudd., *l. c.*, xx., p. 95 (1879); Karsch, Ent. Nachr., xii., pp. 145—147, fig. (1886).

Hab. Gaboon (*Karsch*) ; Old Calabar. B. M.

A very remarkable species, with leaf-like expansions of the front femora and tibiæ, and broad tegmina, emarginate at the apex.

Genus VII. Corycus.

Sauss., Ann. Soc. Ent. France (4), i., p. 487 (1861).

19. *Corycus jurinei.*

Sauss., Ann. Soc. Ent. France (4), i., p. 489, pl. xi., f. 4—7 (1861); Karsch, Berl. Ent. Zeitschr., xxxii., p. 415, fig. (1888).

Hab. Cameroons.

Allied to *Acridoxena.*

Genus VIII. Phyrama.

Karsch, Berl. Ent. Zeitschr., xxxii., p. 416 (1888).

20. *Phyrama interjectum.*

Karsch, Berl. Ent. Zeitschr., xxxii., p. 417, pl. 1, f. 1, 1*a*—*d* (1888).

Hab. South Central Madagascar.

A species of doubtful location, having characters in common with the *Prochilidæ* and *Mecopodidæ.*

Genus IX. Mossula.

Walk., Cat. Derm. Salt., ii., p. 288 (1869).

This genus has an extraordinary resemblance to *Salomona,* Blanch., among the typical *Phasgonuridæ,* in size, shape, the short frontal horn, and even in the neuration, which is more complicated than in *Mecopoda,* and the anterior and posterior radials of the tegmina are completely separated from their origin, running almost parallel throughout, and only slightly diverging at their extremities. But the open foramina, long hind legs, &c., show the real affinities of the genus to be with the *Mecopodidæ.*

21. *Mossula vitticollis.*

Walk., Cat. Derm. Salt., ii., p. 288 (1869).

Hab.——?. B. M.

22. *Mossula Salomonis,* sp. n.

Male and female. Robust, tawny, face varied with whitish, the extremity of the scape, and at least the base of the second joint of the antennæ, black beneath; vertex concave, narrowed in front, and produced between the antennæ into a short spine. Pronotum with two transverse constrictions, the middle lobe with two depressions, starting from a short stem behind, and diverging in

front. Tegmina about as long as the body, subparallel, obtusely rounded at the extremities; testaceous, slightly marked with black between the nervures at the base; speculum of the male oval, very clear hyaline, and surmounted by a clear vitreous space, extending beyond the speculum at each end, and curving downwards opposite to it on the basal side. Wings nearly as long as the tegmina, semicircular, fusco-hyaline. Front femora with 6 spines on the inner carina; front tibiæ with 9—11 spines on each carina; intermediate femora with one row of 6 or 7 spines beneath, and intermediate tibiæ with about 12 pairs of small spines; hind femora thickened at the base, with 8—13 spines on each side; hind tibiæ with about 20 spines on each of the upper carinæ; those on the two lower carinæ rather less numerous. Cerci short, subgenital plate of male with two long-jointed hairy processes; ovipositor of female hardly curved, about as long as the abdomen.

Dimensions.—♂. Long. corp. 45 millim.; long. ant. circà 210; al. ant. long. 41; lat. 14; al. post. long. 38; lat. 29; fem. post. 42; tib. post. 40 millim.

♀. Long. corp. cum ovip. 90—100 millim.; long. ant. circà 220; ovip. 37—39; al. ant. long. 52—60; lat. 13—16; al. post. 48—55; lat. 37—40; fem. post. 44—50; tib. post. 41—43 millim.

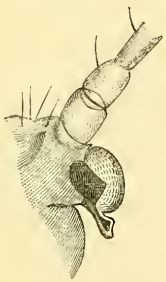
Hab. Solomon Islands. B. M.

A much larger and more robust species than *M. vitticollis*, and with no black markings on the pronotum. Described from one male and five females.

XVII. *Note on* Siphonophora Artocarpi, *Westw.* (Trans. Ent. Soc. Lond., 1890, p. 649). By Prof. John O. Westwood, M.A., F.L.S., &c.

[Read July 1st, 1891.]

I am indebted to Mr. E. Ernest Green, the discoverer of this species in Ceylon, for the following notice of a remarkable structure, which I must have overlooked in my examination of the specimens which he had been good enough to supply me with, and of which I do not recollect another instance. In a note from that gentleman, dated 20th August, 1891, is the following passage:—"With reference to the aphis of the bread-fruit tree, I draw your attention to the lobe or appendage at the hinder angle of the compound eye. This seems to be part and parcel of the eye, though the facets on this part are larger, more irregular, and disconnected from those on the main part. The appendage contains pigment, which is in direct connection with the pigment of the main portion. I have noticed a similar appendage in more or less degrees in several other species of Aphis in Ceylon."



I may be permitted to add that in fig. 1 of my Plate XXI. the very characteristic second branchlet of the post-costal vein is hardly sufficiently curved beyond its centre, and the honey-secreting tubes are even longer in the younger state of the larvæ than in their more advanced state.

XVIII. *On the South American species of* Diabrotica. Part II. By Charles J. Gahan, M.A., F.E.S., Assistant in the Zoological Department, British Museum.

[Read July 1st, 1891.]

The present paper is intended to serve as a continuation of one on the same subject by the late Mr. Joseph S. Baly, F.L.S., &c., which appeared in the first Part of the 'Transactions' of this Society for the year 1890.

A few words in explanation of the circumstances under which I have been induced to write it may not be out of place. Mr. Baly's collection of *Galerucidæ* having passed into the possession of the British Museum, I have been entrusted with its arrangement and incorporation. A number of manuscript descriptions of species—the result of Mr. Baly's work towards a completion of his monograph—was handed over to my care. As this manuscript was in an unfinished state, and without arrangement, it could not with advantage be presented for publication. I have endeavoured instead to complete this second part of the paper, and have included in it nearly all of Mr. Baly's manuscript descriptions. These are clearly indicated in the text, so that Mr. Baly's share of the work may be easily distinguished from my own. I have omitted a few descriptions, having been unable in such cases to satisfy myself as to the identity of the species. Except in a few instances, I have had to add the references to previously published short diagnoses or descriptions.

In the arrangement of the species I have endeavoured to make use, as far as possible, of structural characters. In grouping many of the species, however, I have had to rely upon a general resemblance in facies or coloration.

Table.

Section II. Fourth joint of the antennæ shorter than the second and third united.

A. Elongate or oblong, slightly dilated posteriorly; elytra with raised longitudinal lines, of which one or two on the inner disk of each are somewhat broader than the rest; seriate or subseriate-punctate, the punctures arranged more or less regularly in double rows between the raised lines.
- *a*. Elytra blue, green, brownish, or black; each with a marginal band and a subsutural vitta yellowish.
- *b*. Elytra each with more than one raised line; with the subsutural and marginal vittæ united at the apex.
- *c*. Prothorax yellowish or testaceous. Species 1—6 and 9—12.
- *cc*. Prothorax black. Species 7 and 8.
- *bb*. Elytra each with a single (dorsal) costa, which is abbreviated behind, with the dorsal and marginal vittæ both interrupted posteriorly. Species 13.
- *aa*. Elytra entirely fulvous.
- *d*. Prothorax black. Species 14.
- *dd*. Prothorax testaceous. Species 15.

B. Species small; oblong-ovate, feebly dilated posteriorly; elytra with more or less feebly raised lines, or with a strongly punctured longitudinal depression towards each side between the shoulder and the middle.
- *a*. Elytra with obsolete raised lines. Species 16—18.
- *aa*. Elytra with longitudinal depression behind each shoulder. Species 19 and 20.

C. Body oblong or elongate, distinctly dilated posteriorly. Each elytron in the male with a subsutural cariniform tubercle posteriorly.
- *a*. Elytra with distinctly raised longitudinal lines, the intervals between which are strongly and rugosely punctured.
- *b*. Prothorax black. Species 21 and 22.
- *bb*. Prothorax yellowish or testaceous. Species 23—26.
- *aa*. Elytra closely and somewhat rugosely punctured; with feebly or obsoletely raised longitudinal lines.
- *c*. Prothorax black. Species 27.
- *cc*. Prothorax yellowish or testaceous. Species 28—31.
- *aaa*. Elytra strongly and very closely punctured; without raised lines; entirely metallic-blue, green, or violaceous. Species 32 and 33.
- *aaaa*. Elytra densely and less strongly punctured; nitid or subnitid. Species 34—38.

D. Body elongate, dilated posteriorly; elytra torulose or with depressions and small swellings on the middle of the disk. Species 39—41.

E. Elytra elongate or oblong, either entirely metallic-blue, green, or black, or with the outer limb only yellowish.
- *a*. Elytra strongly and very closely punctured, dilated posteriorly.
- *b*. Elytra entirely metallic-blue or green. Species 42, 43.
- *bb*. Elytra with outer limb yellowish. Species 44—46.
- *aa*. Elytra thickly and more or less strongly punctured, feebly dilated posteriorly; outer limb yellowish. Species 47—53.

F. Ovate, slightly dilated posteriorly. Elytra either wholly metallic-blue or green, or with longitudinal fulvous bands.
a. Elytra wholly metallic-blue or green. Species 54.
aa. Elytra metallic-blue or violet, with outer margin and a sutural vitta, posteriorly abbreviate, fulvous. Species 55.
aaa. Elytra piceous or brown, with suture, entire outer limb, and a median vitta on each fulvous or yellowish. Species 56, 57.

G. Ovate or oblong-ovate, dilated posteriorly.
a. Elytra fulvous or yellowish, with black or brown spots or lines.
b. Elytra with spots or plagæ.
c. Prothorax black or piceous. Species 58—60.
cc. Prothorax wholly or partly yellowish. Species 61—64.
bb. Elytra with longitudinal lines or bands, sometimes also with spots in addition. Species 65—67.
aa. Elytra piceous, black or blue, with yellowish or fulvous markings.
d. Prothorax wholly or partly fulvous. Species 68—70.
Prothorax black. Species 71.

H. Elongate-ovate, feebly dilated posteriorly. Elytra black or brown, with yellowish or greenish markings. Species 72—74.

I. Body subelongate, dilated posteriorly. Antennæ in the male with joints 3rd to 5th somewhat thickened, and usually more or less elongated.
a. Intermediate tibiæ in the male normal. Species 75.
aa. Intermediate tibiæ in the male strongly curved, produced into a tooth at the apex on the ventral side. Species 76.
aaa. Intermediate tibiæ in the male incrassate below, the incrassation beginning with an obtuse tooth or angulation placed either above the middle, at the middle, or nearer to the apex.
b. The incrassation of the intermediate tibiæ beginning at or below the middle. Species 77—81.
bb. The incrassation of the intermediate tibiæ beginning above the middle. Species 82, 83.

J. Ovate or oblong-ovate, dilated posteriorly; elytra usually black, with yellowish fasciæ or vittæ. Species 84—98.

K. Elytra oblong-ovate, distinctly dilated posteriorly, strongly convex, their apices broadly rounded or subtruncate. Head in the male concave or excavated in front.
a. Elytra black or reddish brown, with yellowish bands.
b. Epipleures of elytra black.
c. Elytra with feebly or obsoletely raised lines. Species 99—103.
cc. Elytra without raised lines. Species 104, 105.
bb. Epipleures of elytra, and usually also the entire outer limb, yellowish.
d. Punctuation of elytra rather coarse. Species 106—108.
dd. Punctuation of elytra finer. Species 109—114.
aa. Elytra yellowish, with black bands or spots. Species 115, 116.
aaa. Elytra entirely yellowish or fulvous. Species 117, 118.

L. Ovate, distinctly dilated posteriorly. Elytra subventricose, strongly convex posteriorly.
a. Elytra ampliate, strongly reticulate-corrugate. Species 119.
aa. Elytra wrinkled in parts. Species 120, 121.
aaa. Elytra coarsely rugulose-punctate. Species 122—124.
aaaa. Elytra strongly and closely punctured, without being distinctly rugose. Species 125—127.
aaaaa. Elytra less strongly and less closely punctured, nitid. Species 128—130.

M. Rather broadly ovate, distinctly dilated posteriorly. Elytra with basal half or third part fulvous, the posterior part black or blue.
a. Elytra with posterior dark part opaque. Species 131—134.
aa. Elytra with posterior dark part nitid. Species 135—137.

N. Ovate, dilated posteriorly. Elytra usually fulvous or yellowish, with black plagæ. Each elytron in the male of some of the species with a distinct tubercle placed close to the suture a little before the apex.
a. Prothorax black.
b. Each elytron with two plagæ or spots, one near the base, the other post-median. Species 139, 140.
bb. Elytra with two irregular common black bands. Species 141.
aa. Prothorax yellowish or fulvous.
c. Each elytron with two black plagæ or spots. Species 142—144.
cc. Each elytron with two basal spots and a large post-median spot or plaga black. Species 145.
ccc. Elytra with the apex broadly and a common basal spot black. Species 146.
cccc. Elytra with two large apical plagæ conjoined at the suture, without basal spot. Species 147.

O. Broadly ovate. Elytra strongly dilated.
a. Prothorax yellowish, with two black spots. Elytra yellowish white, each with a subsutural and a submarginal black vitta. Species 148.
aa. Prothorax wholly yellowish. Elytra black, with a broad outer limb slightly dilated at the apex, yellowish. Species 149.
aaa. Prothorax black. Elytra strongly convex, entirely bright metallic-green. Species 150.

P. Species that may be distinguished by the peculiar structure of the antennæ of the male.
a. Antennæ with the 3rd and 6th joints thickened and peculiarly shaped. Species 151.
aa. Antennæ with the last four joints dilated, the 8th and 9th more strongly so than the two last. Species 152.
aaa. Antennæ with the last three joints very strongly thickened in the form of a club. Species 153.
aaaa. Antennæ with the last two joints elongated and considerably dilated. Species 154.

1. *Diabrotica corusca*, Harold.

Coleopt., Hefte xiii. (1875), p. 92; Baly, Journ. Linn. Soc., xix., p. 230.

Hab. Colombia; also Mexico.

2. *Diabrotica innuba*, Fabr.

Syst. Ent., p. 117; Baly, Journ. Linn. Soc., xix., p. 230.

Hab. Colombia, Cayenne; West Indies, Mexico, and North America.

3. *Diabrotica Fairmairei*, Baly.

Hab. Peru; Mexico.

4. *Diabrotica consimilis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 447.

Hab. Ecuador, and Peru.

This species is very nearly allied to *D. Fairmairei*, Baly. It may be doubted whether the differences are more than varietal. In *D. consimilis* the head is black, the antennæ are dark brown except at the extreme base; the flavous dorsal vitta of each elytron covers only the third costa, which is somewhat broader than the others. In *D. Fairmairei* the head and antennæ are reddish, the former sometimes with a violaceous or chalybeous tint; the dorsal flavous vitta of each elytron covers not only the third costa, but also the two rows of punctures on each side of it. The dorsal vitta is consequently broader, but the third costa itself is scarcely broader in *Fairmairei* than in *consimilis*.

5. *Diabrotica albidovittata*, Baly.

Proc. Zool. Soc., 1889, p. 95.

Ovata, postice paullo ampliata, convexa, nigro-picea, nitida, femoribus basi flavis, capite thoraceque piceo-rufis, antennis nigris, articulis octavo nonoque albidis; thorace profunde bifoveolato; elytris piceo-nigris, subnitidis, elevato-vittatis, costa tertia a sutura quam cæteris latiore utrisque limbo externo costaque tertia albidis apice confluentibus.

Long. 3 lin.

Hab. Brazil, St. Catharina.

Head triangular, not longer than broad; clypeus with a strongly raised longitudinal ridge, which runs downwards to join the thickened anterior margin; antennæ three-fourths the length of the body, filiform, the second joint short, obovate, the third and fourth equal, each twice the length of the second; black, the eighth and ninth joints, and in some specimens the lower three-fourths of the tenth, white. Thorax nearly one-half broader than long; sides rounded anteriorly, sinuate behind the middle, the hinder and anterior angles obtuse, the former prominent; above convex, the disk deeply bifoveolate, Elytra oblong-ovate, dilated posteriorly, regularly rounded conjointly at their apices, convex;

each elytron with eight strongly raised costæ, the third from the suture broader than the rest. [Baly.]

6. *Diabrotica venalis*, Erichs.

Archiv. für Naturgeschichte, 1847, i., p. 169.

Hab. Peru.

Blackish brown. Head and prothorax reddish testaceous, the latter smooth and glossy, with two foveolate impressions just behind the middle of the disk. Elytra dark brown, with the costæ not very strongly raised, with the lateral border and a dorsal stripe (embracing the third costa only) of each elytron flavous. Antennæ with the three (or four) basal joints testaceous, the remaining joints black. Legs brownish, with the basal half or two-thirds of the femora flavous.

From *innuba*, Fabr., which it most nearly resembles, this species may be distinguished by the testaceous head, the black antennæ with only three or four of the basal joints testaceous, and by the broader third costa of the elytra. The dorsal yellow vitta embraces only the third costa in *venalis*, while in *innuba* it covers both the second and third costæ, which are equal in width.

7. *Diabrotica cornuta*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 448.

Hab. Peru; Guatemala, Mexico.

8. *Diabrotica semifemorata*, sp. n.

Diabrotica semifemorata, Chev. MS.

Hab. Bolivia.

Black. Prothorax nitid, with two distinct foveolate impressions on the hinder half of the disk. Elytra with feebly raised costæ; black, with the lateral limb and a dorsal stripe, embracing the broad third costa of each, flavous. Antennæ black, with the basal three joints underneath, the eighth wholly, and the basal half of the ninth, flavous. Legs black, with the basal half of the femora flavous.

This species resembles *D. cornuta*, Baly, but is to be distinguished by the colour of the head (black), legs, and antennæ, and by the less strongly raised costæ of the elytra. Uncertain of the sex of the single specimen

before me (which is probably a female), I cannot assign any specific value to the absence of the laterally projecting processes or horns from the clypeal margin, which are characteristic of *D. cornuta*, ♂.

9. *Diabrotica Kirschi*, Baly.

Journ. Linn. Soc , xix., p. 231.

? *Diabrotica demissa*, Erichs., Wieg. Archiv., 1847, i., p. 169.

Hab. Colombia; Mexico.

10. *Diabrotica Theimi*, Baly.

Journ. Linn. Soc., xix., p. 231.

Hab. Bahia, Ecuador, Colombia, Cayenne; Mexico and West India Islands.

11. *Diabrotica bivittula*, Kirsch.

Berl. Ent. Zeit., xxvii. (1883), p. 203.

Hab. Brazil.

12. *Diabrotica separata*, Baly.

Journ. Linn. Soc., xix., p. 232.

Hab. Colombia, Amazons, Cayenne.

13. *Diabrotica vittigera*, Bohem.

Res. Eugen., p. 178.

Hab. Buenos Ayres, Monte Video.

14. *Diabrotica vittatipennis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 454.

Hab. Eastern Ecuador.

15. *Diabrotica Balyana*, Gahan, n.n.

Diabrotica melanocephala, Baly, Trans. Ent. Soc Lond., 1886, p. 455.

Hab. Eastern Ecuador.

16. *Diabrotica similata*, Baly.

Journ. Linn. Soc., xix., p. 235.

Hab. Colombia, Venezuela.

16*a*. *Diabrotica mediovittata*, Baly.

L. c., p. 237.

Hab. Colombia; also Honduras, Nicaragua, and Panama.

This species is, in Mr. Jacoby's opinion (which I am inclined to share), scarcely more than a variety of the preceding.

17. *Diabrotica incerta*, Baly.

Journ. Linn. Soc., xix., p. 236.

Hab. Colombia, Bogota, Magdalena River.

18. *Diabrotica perplexa*, Baly.

Journ. Linn. Soc., xix., p. 237.

Hab. Colombia.

19. *Diabrotica lætabilis*, Baly.

Journ. Linn. Soc., xix., p. 257.

Hab. Colombia—Magdalena River, Bogota.

20. *Diabrotica puella*, Baly.

L. c., p. 238.

Var. *D. cinctella*, Harold, Mitt. Münch. Ent. Ver., 1877, p. 110.

Hab. Colombia; also Central America—Nicaragua, Panama.

21. *Diabrotica flavolimbata*, Erichs.

Archiv. für Naturgeschichte, 1847, i., p. 169.

Diabrotica Balyi, Jac., Cist. Ent., ii., p. 525.

22. *Diabrotica puncticollis*, Baly.

Trans. Ent. Soc. Lond., 1865, p. 346; Journ. Linn. Soc., xix., p. 234.

Hab. Colombia.

23. *Diabrotica cognata*, Baly.

P. Z. S., 1889, p. 93.

Late ovate, postice sat valde ampliata, convexa, dorso subdepressa fulva, nitida, pectore, scutello capiteque nigris; thorace transverso, fortiter punctato, disco profunde bifoveolato; elytris rude et profunde subseriato-punctatis, utrisque tricostatis, nigris, limbo externo fulvo, tibiis anticis quatuor dorso, tarsisque quatuor anticis piceo-tinctis.

Long. 9 mm.

Hab. Ecuador (*Buckley*).

Head scarcely longer than broad, triangular, black, the jaws and palpi piceo-fulvous; clypeus with a strongly raised longitudinal ridge, sides granulose-punctate; antennæ four-fifths the length of body, slender, filiform, the second joint short, subovate, the third three times its length, the fourth as long as the third. Thorax twice as broad as long; sides deeply sinuate, and diverging from the base to beyond the middle, thence rounded to the apex, anterior and posterior angles produced, the former obtuse, the latter subacute: upper surface strongly but not very closely punctured, impressed scarcely behind the middle with two large deep foveæ; the space between slightly depressed. Elytra with the sides gradually dilated from the base to the posterior angle, their apices conjointly regularly rounded; above convex on the sides, flattened along the suture, coarsely and strongly subseriate-punctate; each elytron with three strongly raised longitudinal costæ, which extend from the base nearly to the apex. [Baly.]

24. *Diabrotica rugata*, Baly.

Ann. and Mag. Nat. Hist., 5th ser., vol. iii. (1879), p. 84.

Hab. Ecuador.

25. *Diabrotica coryphæa*, Baly.

Diabrotica coryphæa, Baly, Journ. Linn. Soc., xix., p. 233.

D. puncticollis, var., Kirsch., Berl. Ent. Zeit., xxvii. (1883), p. 203.

Hab. Colombia.

26. *Diabrotica viridipennis*, Jacoby.

Cist. Ent., ii., p. 526.

Hab. Peru.

27. *Diabrotica eximia*, Baly.

Ann. and Mag. Nat. Hist., 5th ser., vol. iii., p. 74.

Hab. Bolivia.

28. *Diabrotica pulchra*, Baly.

Trans. Ent. Soc. Lond., 1865, p. 345.

Diabrotica gloriosa, v. Harold, Mitt. Münch. Ent. Ver., 1877, p. 110.

Hab. Colombia.

29. *Diabrotica verrucosa*, Jacoby.

Elongata, postice paullo ampliata, convexa, fulvo-testacea, nitida, capite nigro, antennis apice pedibusque flavis, scutello thoraceque rufis, hoc trifoveolato; elytris modice convexis medio transversim depressis, ad apicem subventricosis rude rugulosis, viridi-æneis, fascia vix pone medium limboque externo flavis.

Var. A. Elytrorum fascia obsoleta. Jacoby, Proc. Zool. Soc., 1880, p. 603, pl. lv., fig. 1.

Var. B. Antennis flavis articulis intermediis nigris.

Var. C. Antennis totis flavis.

Mas. Elytris vitta curvata elevata ante apicem prope suturam posita instructis.

Hab. Ecuador (*Buckley*).

Head not longer than broad, triangular; clypeus with a distinct longitudinal ridge; antennæ filiform, shorter than the body, the second joint short, the third more than twice its length, rather shorter than the fourth. Thorax one-half broader than long; sides sinuate behind the middle, rounded and converging towards the apex; anterior and hinder angles subacute; disk trifoveolate, the middle fovea placed behind the others, and ill-defined. Elytra oblong, slightly dilated posteriorly, convex, transversely depressed across the middle, subventricose posteriorly, coarsely rugose.

The above insect is very nearly allied to *D. Erichsoni*, Baly. It differs in its somewhat larger size, and in the coarser punctuation and brighter colour of its elytra. The two are possibly extreme forms of the same species. [Baly.]

30. *Diabrotica Erichsoni*, Baly.

Ann. and Mag. Nat. Hist., 3rd ser., iv., p. 272 (1859).

Elongata, postice paullo ampliata, modice convexa, fulva aut rufo-fulva, nitida, capite antennisque, articulis ultimis quatuor exceptis, nigris; thorace trifoveolato, fovea intermedia parva; elytris oblongis, modice convexis, medio late transversim depressis, crebre punctatis, subrugulosis, obsolete tricostatis, his costis interdum totis obsoletis; plumbeis aut sordide viridi-æneis, limbo externo flavo.

Mas. Elytris utrisque creta elevata, leviter curvata ante apicem prope suturam posita.

Hab. Ecuador; banks of the Napo, Upper Amazons.

Head longer than broad, wedge-shaped; clypeus with a faint longitudinal ridge, which extends downwards nearly to the apical margin; antennæ filiform, obsoletely thickened towards the apex, four-fifths the length of the body, the four outer joints yellowish white. Thorax nearly twice as broad as long; sides sinuate behind the middle, rounded and slightly converging anteriorly; above convex, disk broadly excavated, trifoveolate, the middle fovea much smaller than the others. Elytra oblong, very slightly dilated posteriorly, their apices conjointly regularly rounded; above moderately convex, faintly depressed transversely across the middle, finely rugulose, closely punctured; on the middle disk of each elytron are three very fine ill-defined longitudinal costæ, which in some specimens are entirely obsolete. [Baly.]

31. *Diabrotica Batesi*, Baly.

Ann. and Mag. Nat. Hist., 3rd ser., iv., 1859, p. 271.

Hab. Amazons.

32. *Diabrotica vespertina*, Baly.

Ann. and Mag. Nat. Hist., 3rd ser., iv., p. 271.

Elongata, postice paullo ampliata convexa, fulvo-flava, nitida, capite nigro; antennis apice albidis, scutello nigro-piceo; thorace quam longo fere duplo latiori disco late excavata utrinque magis fortiter excavato; elytris oblongis, viridiscente purpureo-metallicis, crebre et fortiter punctatis, rugulosis.

Mas. Antennarum articulis quatuor leviter incrassitis; elytris utrisque ante apicem prope suturam erecta elevata medio torulosa instructis.

Long. 4—5 lin.

Hab. Ecuador; banks of the Napo River (*Buckley*).

Head triangular, not longer than broad; clypeus with a narrow elevated ridge, which extends downwards rather below the middle, and there terminates on a broad ill-defined elevation, which extends obliquely outwards on either side; the surface above this transverse elevation granulose, subremotely punctured, the space below shining, impunctate; antennæ rather shorter than the body, robust in the ♂, rather more slender in the other sex, filiform, the four upper joints slightly thickened in the ♂; the second joint short, obconic; the third more than twice its length, scarcely shorter than the fourth; black, the four upper joints yellowish white. Thorax nearly twice as broad as long; sides broadly margined, deeply sinuate behind the middle, rounded and slightly dilated anteriorly, converging towards the apex, the anterior and posterior angles obtuse; upper surface abruptly deflexed on the sides, flattened and broadly excavated on the disk; the excavation impressed with a shallow ill-defined fovea on either side, in some specimens is also a third fovea, small and ill-defined; this fovea is often entirely obsolete. Scutellum triangular, its apex acute. Elytra narrowly oblong, very slightly dilated posteriorly, their apices conjointly, rather obtusely rounded; above convex, not excavated below the basilar space, closely and strongly punctured, the interspaces rugulose, irregularly and transversely wrinkled on the middle disk; on each elytron in the ♂, placed towards the apex near the suture, is a strongly raised, slightly curved, longitudinal ridge, the middle of which is occupied by a large obtuse tuberosity; the space between the two ridges concave, shining, impunctate. [Baly.]

33. *Diabrotica azureipennis*, Gahan, sp. n.

Diabrotica azureipennis (Dej.).

Flavo-testacea, capite antennis (articulis tribus ultimis albidis exceptis) tibiis tarsisque nigris, elytris cyaneis vel violaceis; prothoracis dorso transversim impresso, nitido, vix punctato; elytris fortiter confertissimeque punctatis. Long. 6—7 mm.

Hab. Cayenne.

Head black, with the under side and palpi yellowish. Antennæ black, with the last three joints whitish; fourth joint almost as long as the second and third united; the third twice as long as the second. Prothorax nearly twice as broad as long; sides sinuate and slightly diverging from the base to beyond the middle, thence converging to the apex; disk with a transverse depression in the

middle. Elytra strongly and very closely punctured; dark blue or violaceous. Body underneath and femora yellowish, tibiæ and tarsi black. Each elytron in the male with a short slightly curved carina near the suture posteriorly.

34. *Diabrotica ornata*, Baly.

Ann. and Mag. Nat. Hist., 3rd ser., iv., p. 273.

Hab. Peru.

35. *Diabrotica adonis*, Baly.

L. c., p. 272.

Hab. Venezuela, Colombia; also Panama.

36. *Diabrotica denotata*, Gahan, n.n.

Diabrotica bipartita, Baly, P. Z. S., 1889, p. 95, nec Jacoby, Biologia C. A., p. 508.

Oblonga, postice ampliata, convexa, flava, nitida; capite, scutello thoraceque nigris, hoc transversim sulcato, basi piceo margmato; antennis flavis, articulis basali et intermediis nigris; elytris oblongis, postice paullo ampliatis, convexis, infra basin excavatis, sat crebre punctatis, dimidio antico, margine excepto, viridi-æneo; prope medium fascia elevata et pone fasciam sulco transverso viridi-æneo instructis.

Mas. Elytris ante apicem prope suturam, vitta obsolete elevata instructis.

Long. 4 lin.

Hab. Eastern Ecuador (*Buckley*).

Head trigonate; antennæ with the third joint three times the length of the second, scarcely shorter than the fourth; the basal joint, together with the fifth, sixth, and seventh, black; the second to the fourth flavous, stained with piceous; the eighth and following ones pale flavous. Thorax twice as broad as long; sides nearly parallel and sinuate from the base to the middle, thence slightly converging towards the apex; disk shining, impunctate, impressed across the middle with a broad transverse sulcation, which is more deeply excavated at either end. Elytra oblong, dilated posteriorly, moderately convex, excavated below the basilar space, distinctly and rather closely punctured; flavous, the anterior disk (the outer margin excepted), together with a transverse sulcation immediately behind the middle, metallic-green; this sulcation, which extends

entirely across the elytron, is bounded anteriorly by a narrow flavous ridge. [Baly.]

37. *Diabrotica suturalis*, Baly.

Trans. Ent. Soc. Lond., 3rd ser., ii., 1865, p. 348.

Hab. Cayenne, Brazil.

38. *Diabrotica triplagiata*, Baly.

Elongata, postice paullo ampliata, modice convexa, flava, nitida, capite nigro, antennis apice flavo-albidis; thorace trifoveolato nigro-cupreo, lateribus pallide flavis; elytris pallide flavis, utrisque plaga magna communi a basi fere ad medium extensa, ad latus abbreviata alteraque pone medium utrinque abbreviata nigro-cupreis.

Diabrotica triplagiata, Baly, Ann. & Mag. Nat. Hist., October, 1859, p. 272.

Var. A. Elytris nigro-cupreis, limbo externo, apice ampliato fasciaque mediali pallide flavis.

Diabrotica trabeata, Kirsch., Berl. Ent. Zeit., xxvii., 1883, Heft 11, p. 201.

Var. B. Elytrorum fascia mediali obsoleta, cæteris ut in Var. A.

Mas. Elytris utrisque pone medium prope suturam carina brevi elevata instructis.

Hab. Ecuador; banks of the River Napo (*Stobel*, *Buckley*). Type and var. A, Upper Amazons; var. B (*Staudinger*).

I cannot separate *D. trabeata*, Kirsch., whose type-specimen I have before me, from *D. triplagiata*, mihi, and have therefore placed the two forms under a single head. *D. fraterna*, an insect closely resembling in coloration the present species, I found on subsequent examination to belong to the genus *Dircema*, Clark. [Baly.]

39. *Diabrotica flavomarginata*, Baly.

Journ. Linn. Soc., xix., p. 234.

Hab. Colombia, Magdelaine, Bogota.

40. *Diabrotica coccinea*, Baly.

Trans. Ent. Soc. Lond., 1865, p. 345.

Var. A. Supra pallide piceo-fulva, cæteris ut in typo.

Var. B. Pectore abdomineque nigris, cæteris ut in var. A.

Hab. Colombia, Magdalena River (type); Cauca (vars. A and B).

The present species is very similar in form to *D. elongata*, Duviv.; it may be known by its smaller size, by the strongly torulose elytra, and by the presence of a third transverse sulcation behind the middle of the latter. [Baly.]

41. *Diabrotica elongata*, Duviv.

Comptes rend. de la Soc. Ent. Belgique, 1887, tom. xxxi., p. xlvii.

Elongata, postice ampliata, convexa, nitida, subtus nigra pedibus piceis; supra picea, elytris apice antennisque sordide fulvis, scutello nigro; thorace quam longiori vix latiori, lateribus sinuatis, disco bifoveolato; elytris infra basin et prope medium transversim depressis, tenuissime punctatis.

Var. A. Pedibus antennisque nigro-piceis, cæteris ut in typo.

Hab. Colombia, Cauca.

Head longer than broad, wedge-shaped; clypeus with a distinct longitudinal ridge; labrum black; antennæ filiform, three-fourths the length of the body, the second joint short, the third more than twice its length, nearly equal to the fourth. Thorax slightly broader than long; sides slightly produced and rounded just before the middle, rather deeply sinuate behind the latter; above moderately convex, rather abruptly deflexed on the sides, shining, very minutely punctured, the punctures only visible under a lens; disk impressed on either side with a large round fovea. Elytra subelongate, gradually dilated posteriorly, their apices conjointly regularly rounded; above convex, minutely punctured, transversely excavated below the basilar space and again across the middle, the space between these depressions thickened.

This species differs from *D. coccinea*, Baly, in the absence of the third transverse depression on the elytra, present in the latter insect, and in the surface between the sulcations being much less strongly thickened. [Baly.]

42. *Diabrotica æneipennis*, Baly.

Journ. Linn. Soc., xix., p. 234.

Hab. Colombia.

43. *Diabrotica cribrata*, Gahan, sp. n.

Sordide flava, antennis (articulo primo subtus excepto) tibiis tarsisque nigris, elytris viridis vel viridi-cyaneis; capite subnitido; prothorace transverso, nitido, impunctato, dorso utrinque leviter vel obsolete foveolato-impresso; elytris creberrime fortiterque punctatis. Long. 8—9 mm.

Hab. Brazil—Petropolis (*J. Gray*).

Antennæ black, with the scape underneath yellow; third joint twice as long as the second, and scarcely shorter than the fourth. Head yellow, somewhat glossy and impunctate; the face rather short, with an obtuse transverse elevation below, from which a very short median ridge passes as far as between the insertion of antennæ. Prothorax yellow, transverse, with the lateral margins very feebly curved in the middle, and slightly projecting in a short blunt process at each of the four angles; the disk glossy and impunctate, and very faintly impressed on each side. Elytra metallic green or bluish green, strongly and very closely punctured; body underneath and femora yellow. Tibiæ and tarsi black.

44. *Diabrotica cinctipennis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 449.

Hab. Peru.

45. *Diabrotica digna*, Gahan, sp. n.

Flava; antennis tibiis tarsisque et elytris nigris, his limbo externo et apice flavis; prothorace transverso, nitido, bi-impresso; elytris fortiter creberrimeque punctatis. Long. 8 mm.

Hab. Brazil, Petropolis, Rio Janeiro.

Antennæ filiform, slightly thickened towards the middle, black; the third joint about equal in length to the fourth. Head and prothorax yellow; the disk of the latter feebly punctured in places, and with two foveolate impressions. Elytra strongly and very closely punctured, black, with a marginal band, slightly increasing in width to the apex, flavous. Femora and under side of the body yellowish; tibiæ and tarsi black.

46. *Diabrotica marginipennis*, Gahan, sp. n.

Diabrotica marginipennis (Reiche MS.).

Sordide flava; antennis, tibiis, tarsisque, et elytris nigris, his marginibus lateralibus et apicalibus flavis; prothorace transverso

nitido, dorso tenuissime sparsissimeque punctato, utrinque leviter foveolato-impresso; elytris sub-nitidis, sat fortiter et dense punctatis. Long 6 mm.

Hab. Brazil, Rio Janeiro.

Antennæ filiform, black, with the third joint more than twice as long as the second, and about equal in length to the fourth. Prothorax transverse, yellowish, nitid; the disk with some feeble punctures towards the sides and base, and with a foveolate impression on each side of the middle. Elytra subnitid, thickly and somewhat strongly punctured, black, with a marginal band, widening slightly towards the apex, flavous. Legs and under-side of body sordid yellow; tibiæ and tarsi black.

This species closely resembles the preceding, but is smaller, with the elytra somewhat glossy, and their punctures not so strong nor so closely placed together.

47. *Diabrotica albidocincta*, Baly, sp. n.

Subelongata, postice paullo ampliata, convexa, nigra, nitida; femoribus, dorso exceptis, tibiis anticis, dorso exceptis, tibiis posticis apice, antennis apice, thoracis lateribus elytrorumque limbo externo, albidis; thorace transverso, lateribus ante medium paullo ampliatis, disco profunde bifoveolato, postice sat fortiter punctato; elytris crebre sat fortiter punctatis.

Long. 6½ mm.

Hab. Brazil.

Head triangular, not broader than long; clypeus with a strongly raised longitudinal ridge; antennæ filiform, very slightly thickened at the apex, nearly equal to the body in length, the second joint oblong-ovate, the third twice its length, equal to the fourth; black, the upper two joints, the apex of the terminal one excepted, white. Thorax more than one-half broader than long; sides rather broadly margined, sinuate and diverging to just beyond the middle, thence rounded and converging towards the apex, the anterior angles tuberculate, the hinder ones subacute; upper surface moderately convex; hinder disk impressed with two large deeply excavated subtrigonate foveæ, which are separated from each other by a narrow line; anterior disk shining, nearly impunctate, the hinder disk, together with the foveæ, strongly punctured. Scutellum nigro-piceous. Elytra narrowly oblong, slightly dilated posteriorly, regularly rounded at the apices, convex, flattened along the suture, the humeral callus prominent; surface strongly and rather closely punctured. [Baly.]

48. *Diabrotica flavocincta*, Baly.

Journ. Linn. Soc., xix., p. 235.

Hab. Colombia.

49. *Diabrotica Staudingeri*, Baly.

Ent. Mo. Mag., xxv., p. 254.

Elongata, postice vix ampliata, modice convexa, nigra, nitida; femoribus, thoracis superficie inferiori lateribusque elytrorumque limbo externo apice ampliato, flavo-albidis; thorace quam longo vix latiori, fortiter punctato, disco obsolete excavato; elytris anguste oblongis, subcrebre fortiter punctatis.

Long. 9 mm.

Hab. Colombia, Cauca; a single specimen.

Head triangular, not longer than broad; clypeus with a strongly raised longitudinal ridge; antennæ slender, filiform, nearly equal to the body in length, the second joint shorter, the third twice its length, nearly as long as the fourth, the basal joint piceous beneath, the roots black. Thorax only slightly broader than long; sides rounded before the middle, sinuate behind the latter, the anterior angles thickened, obtuse, the hinder ones subacute; upper surface convex, obsoletely excavated on the middle disk, coarsely punctured; the extreme lateral border yellowish white. Elytra narrowly oblong, scarcely dilated posteriorly, their apices conjointly regularly rounded; above moderately convex, strongly punctured; subhumeral ridge obsoletely elevated, bounded within by a broad shallow sulcation. [Baly.]

50. *Diabrotica limbatipennis*, Baly.

P. Z. S., 1889, p. 93.

Subelongata, postice vix ampliata, convexa, nigra, nitida; femoribus basi elytrorumque limbo externo flavo-albidis; thorace quam longo fere duplo latiori, dorso vix pone medium bifoveolato; elytris sat crebre punctatis, punctis apicem versus minus fortiter impressis, cæruleo-nigris, limbo externo late albidis.

Long. $4\frac{1}{2}$ mm.

Hab. Brazil, New Friburg.

Head triangular, not longer than broad; clypeus with a strongly raised longitudinal ridge; sides vaguely punctured; antennæ filiform, nearly equal to the body in length, the second joint

short, obovate, the third and fourth equal, each nearly twice the length of the second. Thorax nearly twice as broad as long; sides straight and nearly parallel from the base to beyond the middle, thence obliquely converging towards the apex, anterior and posterior angles acute; above convex, impressed on the hinder disk just behind the medial line of the thorax with two large foveæ. Elytra narrowly oblong, scarcely dilated posteriorly, regularly rounded at the apices, convex, not excavated below the basilar space, rather strongly punctured, the puncturing finer towards the apex; on each elytron, when viewed obliquely, are seen several faintly elevated longitudinal costæ. [Baly.]

51. *Diabrotica abbreviata*, Baly.

Journ. Linn. Soc., xix., p. 238.

Hab. Colombia.

52. *Diabrotica cinctella*, Chevr.

Luperus cinctellus, Chevr., in Guér. Icon. règne anim., p. 304, pl. 49, *bis*. fig. 6.

"Niger, capite, thorace (foveis duabus), margine elytrorum femoribus primoque articulo antennarum infra luteis; elytris nitidis crebre punctatis." Long. 5 mm.

Hab. Brazil.

Head and prothorax sordid yellow; the disk of the latter rather closely punctured, with two foveolate depressions, which are sometimes united together transversely. Elytra closely and not very strongly punctured, nitid, black; with the outer border, slightly and angularly dilated at the apex, yellow. Body underneath (prothorax excepted), tibiæ, tarsi, and the tips of the femora above, black.

Var. Disk of prothorax with a median oblong black spot.

This species is most nearly allied to *D. limbifera*, Baly, from which it is to be distinguished by the black colour of its breast and abdomen. In its shape and coloration of its upper side, it has a strong resemblance to *D. cinctella*, Harold.

53. *Diabrotica limbifera*, Baly.

Trans. Ent. Soc. Lond., 1879, p. 257.

Hab. Peru.

54. *Diabrotica brasiliensis*, Jacoby.

Notes Leyden Mus., vol. x. (1888), p. 156.

Hab. Brazil.

55. *Diabrotica dorsalis*, Jac.

Cist. Ent., ii., p. 523.

Hab. Peru.

56. *Diabrotica alternata*, Baly.

Journ. Linn. Soc., xix., p. 244.

Hab. Colombia.

57. *Diabrotica tæniolata*, Gahan, sp. n.

Brunnea; antennis articulis octavo nonoque sordide albis; prothorace transverso, disco punctulato et bifoveolato; elytris crebre fortiterque punctatis, rufo-brunneis, marginibus externis sutura et vitta utrinque ab humero descendente, pallide flavis; femoribus basi abdominisque annulis flavo-testaceis. Long. 5½ mm.

Hab. Peru.

This species may be placed near *D. alternata*, Baly, from which it is to be distinguished by its reddish or chocolate-brown colour, and by the stronger and closer punctuation of its elytra. In *alternata* the legs are entirely yellowish; in the present species the tibiæ, tarsi, and the tips of the femora are reddish brown.

58. *Diabrotica spiloptera*, Baly.

Journ. Linn. Soc., xix., p. 242.

Hab. Colombia.

59. *Diabrotica piceicollis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 453.

Hab. Amazons.

60. *Diabrotica melanospila*, Gahan, n. n.

Diabrotica spiloptera, Baly, P. Z. S., 1889, p. 92.

Anguste ovata, postice ampliata, convexa, nigra, nitida; femoribus, abdomine (hoc piceo tincto) elytrisque flavis; his distincte minus crebre punctatis, utrinque plagis tribus prime infra basin

callum humeralem posita, trigonata, secunda prope medium transversa, tertiaque pone medium subrotundata, nigris ornatis.

Long. 4½ mm.

Hab. Brazil.

Head not longer than broad, triangular; clypeus smooth, impunctate; antennæ filiform, obsoletely thickened towards the apex, the second joint short, ovate, the third nearly twice its length, the fourth slightly longer than the third; the two lower joints glabrous, the rest clothed with fuscous hairs. Thorax about one-fourth broader than long; sides broadly margined, nearly straight, and very slightly diverging from the base to beyond the middle, thence rounded and converging towards the apex, the anterior angles rounded, the hinder ones subacute; above convex, rather abruptly deflexed on the sides, flattened on the middle disk, subremotely punctured. Elytra ovate, dilated posteriorly, their apices regularly rounded above, convex, not depressed below the basilar space, rather strongly punctured, the outer limb broad. [Baly.]

61. *Diabrotica significata*, Gahan, sp. n.

Diabrotica signifera, Chev. MS., nec Jac.
D. 15-maculata (Dej.).

Oblongo-ovata, flava, nitida; capite obscure rufo; antennis articulo primo flavo, ceteris ferrugineis vel fuscis; prothorace dorso convexo, maculis duabus brunneis ornato; scutello piceo-rufo; elytris flavis, maculis tredecim brunneis—una communi elongata pone scutellum, una utrinque ad humerum, duabus utrinque ante, duabus pone medium, una minuta utrinque prope apicem; prosterno, abdomine pedibusque testaceo-flavis; pectore ferrugineo vel fusco. Long. 6 mm.

Var. Elytris fere omnino flavis.

Hab. Brazil, Bahia.

Head dark red, somewhat glossy. Antennæ with the first joint yellow, the remaining joints reddish brown or dark brown, with the third and following joints subequal, each rather more than twice as long as the second. Prothorax a little broader than long, yellow, nitid, and marked on the disk with two brownish spots. Elytra yellowish, glossy, almost impunctate, with, usually, thirteen brownish or reddish brown spots, of which one, common, elongate, and spatulate, is placed behind the scutellum, one on each side just over the shoulder, two on each side before the middle, which are often confluent, two on each side behind the middle, and one very small spot close to the suture on each side near the apex. In one

or two specimens the small posterior spots are wanting. In another the three outer spots of each elytron are united to form a longitudinal band. Again, there is a variety in which the elytra are almost wholly flavous, the brown being restricted to a very short sutural line behind the scutellum, and a short broken vitta passing back from each shoulder.

62. *Diabrotica maculatipennis*, Baly, sp. n.

Anguste ovata, postice paullo ampliata, convexa, flava, nitida, pectore capiteque nigris, antennis basi piceis apice piceo-fulvis, scutello piceo; thorace quam longo paullo latiori, convexo, minute subremote punctato, fulvo-rufo; elytris subcrebre punctatis, utrisque maculis sex nigris ornatis.

Long. 5—5½ mm.

Hab. Brazil, Tejuca (*Gray*).

Head triangular, not longer than broad; clypeus with a strongly elevated ridge; antennæ nearly equal to the body in length, filiform, the second joint short, subovate, the third twice its length, nearly as long as the fourth, the first and fourth joints piceous, the second and third, together with the three upper ones, piceo-fulvous. Thorax scarcely one-fourth broader than long; sides straight and parallel from the base to beyond the middle, thence slightly converging towards the apex, the hinder and anterior angles obtuse; upper surface convex, finely and subremotely punctured. Elytra ovate, moderately dilated posteriorly, the apices conjointly rounded; above convex, obsoletely depressed on the suture below the basilar space, distinctly punctured; each elytron with six black or nigro-piceous markings, one basal, linear, placed on the suture, common, and extending for nearly one-third of its length, a second large, subovate, covering the humeral callus, two very small, placed transversely near the middle of the disk, and two rather larger, placed transversely and somewhat obliquely half-way between the middle and the apex. [Baly.]

63. *Diabrotica nigropunctata*, Gahan, sp. n.

Oblongo-ovata, postice paullo ampliata, convexa, nigra, prothorace elytrisque fulvis; prothorace crebre obsoleteque punctato, nitido; elytris crebre punctatis, utrisque punctis sex nigris. Long. 5½ mm.

Hab. Brazil.

Head black, clypeus with a rather feebly raised longitudinal carina. Antennæ black, more than half the length of the body;

third joint twice as long as the second, and about equal in length to the fourth. Prothorax about half as broad again as long; sides parallel and feebly sinuate from the base to beyond the middle, thence converging to the apex; the anterior angles slightly tuberculate; upper surface convex, closely but somewhat indistinctly punctured. Scutellum black. Elytra closely punctured, fulvous, each with six small somewhat rounded black spots, one on the humeral callus, one on the disk nearly half-way between the basal margin and the middle, two placed transversely at about the middle, the remaining two placed slightly obliquely between the middle and the apex.

The above characters apply to two specimens in the B. M. collection. In a specimen from Parana, with somewhat shorter antennæ, the clypeus has a more distinct longitudinal carina, and the upper surface of the prothorax is very distinctly punctured. These differences are perhaps sexual. I cannot regard them as specific, the agreement in other respects being so extremely close.

64. *Diabrotica biseriata*, Gahan, sp. n.

Oblongo-ovata, postice ampliata, sordide fulva, capite antennis (his basi apiceque exceptis) pectore et maculis octo subquadratis elytrorum (quatuor ad basin transversim—quatuor versus apicem subarcuatim—positis) nigris; prothoracis dorso nitido, obsolete punctulato, antice utrinque bifoveolato; elytris crebre punctulatis, utrisque pone humerum longitudinaliter subsulcatis. Long. 7—9 mm.

Hab. Brazil, Parana.

Head black, rather short in front, with a median foveolate impression above the insertion of the antennæ; these rather longer than half the body, black, with the first three joints, the last two joints, and the under side of the fourth joint, fulvous; third joint almost three times as long as the second, and nearly equal in length to the fourth. Prothorax with length to breadth as 3 to 2; disk nitid, obsoletely punctulate, with a feeble foveolate impression on each side before the middle. Elytra closely punctate, with a short and feeble longitudinal groove on each side behind the shoulder; each with four somewhat square or oblong black spots, two placed transversely at the base, two slightly obliquely between the middle and the apex; with the parts surrounding the black spots somewhat paler in colour than the rest of the surface. Breast black; legs and rest of the under side of the body fulvous.

65. *Diabrotica humeralis*, Gahan, sp. n.

Fulvo-testacea; capite metasternoque nigris, antennis medio apiceque infuscatis; prothoracis dorso impunctato, nitido, obsolete tri-impresso; elytris dense distincteque punctatis, utrisque vittis brevibus duabus (una marginali, altera dorsali) antice ad humerum conjunctis, et maculis duabus, pone medium obliquiter positis, nigro-cyaneis. Long. 6½ mm.

Hab. Peru.

Head black. Prothorax testaceous, nitid, almost impunctate, and with three very faint and almost obsolete impressions on the disk; sides straight and nearly parallel from the base to the anterior third, thence converging anteriorly. Elytra dilated posteriorly, thickly and rather strongly punctured; each with two short vittæ, one along the margin below the shoulder, the other on the disk above the shoulder, which are united in front, and with two spots, obliquely placed between the middle and the apex, dark blue.

66. *Diabrotica bistrigata* (Reiche MS.), sp. n.

Ovata, postice paullo dilatata; capite nigro; antennis medio fuscis, basi apiceque fulvis; prothorace testaceo, disco convexo levi vix punctato; elytris dense punctulatis, flavis, sutura breviter pone scutellum et vitta utrinque ab humero descendente et postice abbreviata nigro-fuscis; corpore subtus (pectore nigro excepto) pedibusque flavis.

Long. 5—6 mm.

Hab. Brazil: Petropolis, Constancia, Tejuca (*H. Clark and J. Gray*).

Head black; antennæ dark brown, with the two or three last and usually also the first two or three joints fulvous. Prothorax testaceous, the disk smooth, convex, and almost impunctate. Elytra thickly and finely punctured, yellow, with the suture for a short distance behind the scutellum and a vitta on each side from the shoulder extending to about the beginning of the apical third, and often interrupted a little before its extremity, brownish black.

This species resembles some in the first section, but is easily to be distinguished by the relative length of the third antennal joint. This joint is more than twice as long as the second, and is quite equal in length to the fourth.

67. *Diabrotica interruptolineata*, Baly.

P. Z. S., 1889, p. 91.

Ovata, postice ampliata, convexa, fulvo-flava, nitida; pectore, scutello, capitis vertice, ore antennisque nigris, his apice albidis; thorace lævi; elytris crebre punctatis, flavis, utrisque linea discoidali, pone basin late interrupta, longe ante apicem abbreviata, alteraque submarginali, a basi fere ad apicem extensa nigris.

Long. 8 mm.

Hab. Brazil, Tejuca (*Gray*).

Head triangular, not longer than broad; clypeus with a broad longitudinal ridge; antennæ four-fifths the length of the body, filiform, the second joint short, submoniliform, the third more than twice its length, distinctly longer than the fourth; black, the three outer joints yellowish white, the basal joint, and in some specimens the following one, piceous, stained above with black. Thorax scarcely one-half broader than long; sides nearly straight and slightly diverging from the base to beyond the middle, thence rounded and converging towards the apex, the anterior angles thickened, subtuberculate, the hinder ones acute; disk concave, shining, impunctate. Elytra oblong-ovate, dilated posteriorly, regularly rounded conjointly at the apices; convex, not excavated below the basilar space, closely and rather strongly punctured, obsoletely rugulose. [Baly.]

68. *Diabrotica delicula*, Erichs.

Wieg. Archiv. für Naturg., 1847, i., p. 169.

Hab. Peru.

69. *Diabrotica 10-verrucata* (Chev. MS.), sp. n.

Capite nigro, subnitido; antennis fusco-ferrugineis articulo basali piceo; prothorace fulvo, nitido, dorso convexo impunctato; elytris sat dense punctulatis, nigris, singulis maculis quinque fulvis (2, 2, 1) posteriore maxima rotundata; corpore subtus (prothorace excepto) pedibusque nigris. Long. 6 mm.

Hab. Brazil (Porto Allegro).

Head black and somewhat glossy. Antennæ dusky ferruginous, with the basal joint pitchy brown and shining. Prothorax transverse, fulvous; disk convex, smooth and impunctate. Elytra slightly dilated posteriorly, very finely and rather thickly punctured, black; each with five fulvous spots, of which two are in front of the middle, two at or just behind the middle, the fifth,

larger and more rounded, near the apex. The legs and the under side of the body, the prothorax excepted, are black.

This species looks, at first sight, somewhat like *D. Chevrolati*, Har., but is very distinct.

70. *Diabrotica Chevrolati*, Harold.

Col., Hefte xiii., 1875, p. 93.

Hab. Colombia.

71. *Diabrotica Volxemi*, Baly.

Ent. Mo. Mag., xxv., p. 253.

Ovata, postice ampliata, convexa, nigro-cuprea, nitida, antennis nigris; thorace bifoveolato, subcrebre punctato; elytris tenuiter punctatis, fulvis, limbo externo, sutura maculisque irregularibus, hic illic inter se confluentibus, nigro-cupreis.

Long. 6½—7½ mm.

Hab. Brazil (*Van Volxem*).

Head triangular, scarcely longer than broad; clypeus finely punctured, its medial line with an impunctate longitudinal ridge; antennæ filiform, the second joint short, obovate, the third nearly twice its length, the fourth scarcely longer than the third; black, the bases of the three or four lower joints piceous. Thorax about one-half broader than long; sides slightly sinuate and slightly diverging from the base, thence obliquely rounded and converging towards the apex, the anterior angles tuberculate, the hinder ones acute; upper surface moderately convex, distinctly and rather closely punctured; disk impressed on either side with a deep round fovea. Elytra broadly ovate, dilated posteriorly, their apices conjointly regularly rounded, moderately convex, not impressed below the basilar space, minutely punctured. [Baly.]

72. *Diabrotica Deyrollei*, Baly.

Trans. Ent. Soc. Lond., 3rd ser., ii. (1865), p. 347; Journ. Linn. Soc., xix., p. 241.

Hab. Colombia.

73. *Diabrotica æneiventris*, Baly.

P. Z. S., 1889, p. 91.

Anguste ovata, postice ampliata, convexa, nigro-ænea, nitida, tibiis, tarsis, scutello capiteque nigris, antennis basi piceo-fulvis,

articulis apicalibus quatuor, ultimi apice excepto, pallide flavis; thorace, femoribusque flavis, his dorso nigro-lineatis; thorace obsolete tri-impresso; elytris tenuiter sat crebre punctatis, viridi-æneis, utrisque limbo externo, maculis duabus infra basin, transversim positis, fascia curvata vix pone medium, utrinque abbreviata, maculaque subapicali ad limbum adfixa, flavis.

Long. 11 mm.

Hab. Banks of Napo.

Head longer than broad, wedge-shaped; clypeus with a distinctly elevated longitudinal ridge; antennæ filiform, more than half the length of the body, the second joint short, the third twice its length, nearly as long as the fourth; black, the four lower joints piceo-fulvous, stained above with nigro-piceous, the four upper ones, the apex of the apical one excepted, pale flavous. Thorax twice as broad as long; sides straight and nearly parallel from the base to beyond the middle, thence obliquely converging towards the apex, all the angles slightly produced, acute; disk transversely convex, finely but subremotely punctured; disk impressed transversely on either side with a shallow oblong fovea, medial line impressed at the base with a short longitudinal groove. Elytra narrowly oblong, dilated posteriorly, regularly rounded conjointly at the apex, convex, slightly flattened along the suture, finely and rather closely punctured. [Baly.]

74. *Diabrotica Reichei*, sp. n.

Diabrotica glauconotata (Reiche MS.).

Pallide-olivacea; capite, metathorace tibiis tarsisque et elytris nigris, his limbo externo et maculis tribus magnis utrinque flavo-olivaceis, antennis articulis 2o ad 6um fuscis, sequentibus fulvo-ferrugineis; prothorace quam longitudine vix latiore, lateribus subparallelis, medio leviter sinuatis; dorso leviter convexo, nitido, obsolete punctulatis, elytris oblongo-ovatis dense punctulatis. Long. 9 mm.

Hab. Ecuador and Colombia.

Head black; front rather short, with a median ridge passing from the raised clypeal margin to a point between the insertion of the antennæ. Antennæ with the basal joint yellowish, the following joints to the sixth dark brown, the remaining joints fulvous red; with the third joint twice as long as the second, and almost equal in length to the fourth. Prothorax almost as long as broad, slightly convex on the disk, glossy and obsoletely punctu-

late; sides nearly parallel, feebly sinuate in the middle, slightly converging at the apex. Elytra black, thickly and finely punctured; each with a short longitudinal groove behind the shoulder, with the outer margin and three large spots pale olivaceous yellow. The first spot is near the base, the second transverse and touching on the outside the marginal band, is placed at the middle, the third is quite at the apex, where it joins the marginal band; the latter is slightly expanded opposite the interval between the two anterior spots. The femora and the under side of the body, the metathorax excepted, are greenish testaceous.

This species resembles in coloration *D. viridimaculata*, Jac., but may be distinguished by its larger size, and the relative length of the third joint of its antennæ.

75. *Diabrotica Steinheili*, Baly.

Journ. Linn. Soc., xix., p. 240.

Hab. Colombia.

76. *Diabrotica 10-guttata*, Oliv.

Entom., vi., p. 651, tab. iv., fig. 63.

Anguste oblonga, postice paullo ampliata, convexa, subtus flava, pectore tibiis tarsisque piceis; supra picea aut nigro-picea, thorace, scutello antennarumque articulis subapicalibus flavis; elytris oblongis, postice paullo ampliatis tenuiter, crebre punctatis, utrisque limbo exteriori maculisque quinque, 2, 2, 1 dispositis, flavis.

Var. A. Capite cum antennis flavis.

Var. B. Elytrorum limbo disco concolori.

Var. C. Elytrorum maculis inter se confluentibus.

Var. D. Elytris totis flavis.

Mas. Antennis articulis tertio ad quintum elongatis, paullo incrassatis; tibiis intermediis curvatis, apice acutis.

Fœm. Antennis filiformibus articulis intermediis non incrassatis; tibiis intermediis simplicibus.

Long. 8—9 mm.

Hab. Cayenne, Amazons, Peru; Bahia (*Olivier*).

Antennæ nearly equal to the body in length, the third joint nearly three times the length of the second, only very slightly shorter than the fourth, the latter equal to or slightly longer than the fifth, the third, fourth, and fifth in the ♂ longer than the following ones, and slightly thickened. Thorax twice as broad as

long; sides obliquely converging from the base to the apex, obsoletely bisinuate and angulate near the middle, the basal angle produced, subacute; above transversely convex, slightly flattened on the hinder disk, shining, impunctate. Elytra closely but finely punctured.

This species is very variable in the coloration of the head and elytra; the form passes through all the intermediate degrees from nigro-piceous to flavous. The elytra vary equally. I do not possess a specimen exactly agreeing with the description given by Olivier, but have little doubt that specimens similarly coloured do occur. [Baly.]

77. *Diabrotica Belemea* (Reiche MS.), sp. n.

Flavo-testacea vel fulva; capite supra nigra, antennis fuscis, articulis basalibus brunneis vel flavo-brunneis, articulis 7o et 8o albescentibus; prothorace transverso, ante basin obsolete transversim depresso, lateribus leviter bisinuatis, disco subtiliter haud dense punctulatis; elytris crebre punctulatis, nigro-fuscis, limbo externo, margine basali, macula utrinque prope basin, fascia transversa vix pone medium ad suturam angustim interrupta, et macula utrinque ante apicem, flavis vel fulvis; corpore subtus (lateribus pospectoris exceptis) femoribusque flavis, tibiis tarsisque infuscatis.

Mas. Articulis antennarum 3o, 4o et 5o leviter crassatis, tibiis intermediis leviter curvatis vix ante apicem subtus angulato-dilatato; articulo primo tarsi antici dilatato et subelongato. Long. 6—8 mm.

Hab. Pará (or Belem).

In structural characters this species comes nearest to *D. spectabilis*, Baly, but is easily to be distinguished from that species by the colour and marking of the elytra. The marking of the elytra is apt to vary, without, however, in any case resembling that of *spectabilis*. In one variety the elytra are yellowish, with the suture, the extreme apex, and a submarginal vitta, dilated on the inner side at its posterior extremity, dark brown. The colour of the head is also variable; in some specimens the front is black, and the upper side, except around the eyes, testaceous.

78. *Diabrotica spectabilis*, Baly, sp. n.

Ovata, postice ampliata, convexa, flavo-fulva, nitida, pectore capiteque nigris, antennis basi fulvis, articulis octavo et nono totis

decimoque basi albidis; tibiis tarsisque nigro-piceis; thorace quam longo fere duplo latiori, convexo, lævi; elytris rude punctatis, subnitidis, nigris, utrisque maculis duabus infra basin transversim positis, una ante apicem, lineaque transversa prope medium, utrinque abbreviata albidis.

Mas. Antennarum articulis tertio ad quintum elongatis, inter se æqualibus, leviter incrassatis; tibiis intermediis curvatis, apice incrassatis, obtusis.

Long. 8½ mm.

Hab. Upper Amazons, Nauta (*Bates*).

Head not longer than broad, triangular, black, the cheeks and mouth flavous; clypeus with a strongly elevated longitudinal ridge; antennæ in the ♂ (*the only sex known to me*) slightly exceeding the body in length; the second joint short, subovate, the three following ones equal, slightly thickened, cylindrical, each more than twice as long as the second, the sixth to the eleventh shorter and more slender, equal to each other in length; the basal joint piceous, the seventh, eight, and basal portion of the ninth yellowish white, the rest black. Thorax nearly twice as broad as long at the base; sides nearly parallel and faintly sinuate from the base to the middle, thence very slightly and obliquely converging towards the apex, the anterior angles slightly produced, obtuse, the hinder ones acute; upper surface transversely convex, very slightly flattened on the hinder portion of the middle, minutely but not closely punctured; sides rather abruptly deflexed. Elytra oblong, slightly dilated posteriorly, regularly rounded at the apex; above convex, rather coarsely punctured, the interspaces subrugulose.

Separated from *D. 10-guttata* by the more slender antennæ, and by the apices of the intermediate pair of tibiæ being obtuse, not acuminate. I only know two specimens, both males, from the Upper Amazons. [Baly.]

79. *Diabrotica conformis*, sp. n.

Capite supra nigro, subtus testaceo; antennis fuscis, articulis 6o ad 8um albescentibus; prothorace transverso, sat dense subtiliterque punctulato, testaceo; elytris crebre punctulatis, subnitidis, nigris, utrisque margine basali et maculis tribus (una ante medium, una vix pone medium, tertia prope apicem) flavo-albescentibus; corpore subtus (post-pectore excepto) fulvo; tibiis tarsisque et apicibus femorum quatuor posteriorum, infuscatis.

Long. 6—7 mm.

Mas. Antennis articulis 3o—5um leviter incrassatis; tibiis intermediis tertia parte apicali leviter sed manifeste dilatata.

Hab. Amazons, Santarem; Cayenne, and Colombia, Cauca.

This species is somewhat variable. In the single specimen from Cayenne the spots of the elytra are larger, and the punctuation of the thorax somewhat stronger than in typical examples. In the two specimens from Colombia, each elytron has, instead of a spot, a narrow transverse band near the middle. This variety has a close resemblance to *D. spectabilis*, Baly.

The male of the present species has the first joint of the anterior tarsi slightly elongated, but scarcely dilated, and has rather more than the distal third of the intermediate tibiæ thickened. By these characters it may be easily distinguished from the same sex of *D. spectabilis*.

80. *Diabrotica delecta*, Gahan, n. n.

Diabrotica leucospila, Baly MS., nec Baly, Journ. Linn. Soc., xix., p. 253.

Anguste ovata, postice ampliata, convexa, flava, nitida; tibiis anticis dorso, posticis quatuor totis, tarsis, pectore, scutello, capiteque nigris, aut nigro-piceis, facie inferiori antennarumque articulis sexto ad nonum albidis; thorace quam longo plus dimidio latiori, transversim convexo, lævi; elytris distincte sed tenuiter punctatis, utrisque limbo externo ad apicem abbreviata, maculis duabus subrotundatis, una infra basin, una ante apicem fasciaque pone medium utrinque abbreviata, albidis.

Mas. Antennarum articulis tertio ad quintum elongatis, paullo incrassatis; femoribus intermediis subtus obsolete tuberculatis; tibiis ejusdem paris pone medium incrassatis.

Long. 7 mm.

Hab. Amazons, Nauta (*Bates*).

Head slightly longer than broad, subcuneiform; clypeus with a broad longitudinal ridge, the lower half of which is triangularly dilated; the lower face white, the labrum and jaws pale piceous; antennæ in the ♂ slightly exceeding the body in length, the second joint nearly twice as long as broad, obovate, the third, fourth, and fifth each more than twice the length of the second, slightly thickened, cylindrical; the sixth to the eleventh shorter and more slender than the preceding ones, nearly equal, the sixth to the ninth yellowish white. Thorax more than one-half broader than

long; sides very slightly converging from the base to the middle, thence more strongly converging and sinuate towards the apex, the anterior and posterior angles produced, the former thickened, obtuse, the latter subacute; upper surface transversely convex, obsoletely excavated on the hinder disk, impressed subremotely with large shallow punctures. Elytra oblong, slightly dilated posteriorly, regularly rounded at the apices, convex, distinctly punctured, the interstices smooth. [Baly.]

81. *Diabrotica nigrovittulata*, Baly.

Journ. Linn. Soc., xix., p. 242.

Hab. Colombia, Venezuela.

Mr. Baly described this species from a single male specimen from Colombia, but he has omitted some important characters of this sex, *viz.*: Antennæ with the third, fourth, and fifth joints somewhat thickened, the fifth joint nearly twice as long as the sixth. Intermediate femora with a small tubercle on the under side just below the middle; intermediate tibiæ somewhat dilated from the middle up to the apex, with the ventral side somewhat angulate at the point where the dilatation begins.

The bands on the elytra in this species are subject to variation. In a specimen from Venezuela the posterior median vitta is wanting, and the two external vittæ of each elytron are united to form one long submarginal black band. A second specimen from Colombia differs from the type in having the three anterior bands united behind, while a broad transverse fascia joins the anterior ends of the three posterior vittæ.

82. *Diabrotica paraensis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 452.

Mr. Baly has not mentioned the following characters of the male :—Antennæ with the third, fourth, and fifth joints somewhat thickened. Intermediate femora each with a small tubercle on the under side at about the beginning of the distal third. Intermediate tibiæ angulate on the under side above the middle, and from thence dilated as far as the apex.

83. *Diabrotica zelota*, Gahan.

Trans. Ent. Soc. Lond., 1891. p. 373.

Capite nigro; antennis fuscis, articulo primo pallide brunneo, articulis 8o ad 10um fulvis; prothorace transverso, testaceo, nitido; scutello nigro; elytris dense punctulatis, flavis, sutura antice, vitta utrinque submarginali et macula parva utrinque pone medium, nigris; corpore subtus (post-pectore excepto) flavescente; pedibus totis fulvis.

Mas. Articulis antennarum 3o ad 5um incrassatis; femoribus intermediis subtus infra medium unituberculatis; tibiis intermediis subtus supra medium angulatis, deinde ad apicem dilatatis. Long. 6—7 mm.

Hab. Brazil; Rio Janeiro (*J. Gray*), Bahia.

Head black; front with a rather sharp median carina extending from the raised clypeal margin to between the insertion of the antennæ. Antennæ blackish brown, with the first joint light brown, or in some cases yellowish, with joints 8—10 fulvous. Prothorax transverse, testaceous, nitid. Elytra closely punctulate, yellowish, with the suture for a short distance behind the scutellum, a submarginal vitta on each side from the shoulder extending to about the beginning of the apical fifth, and a spot on each just inside and anterior to the posterior extremity of the vitta, black. Body underneath yellowish, hind breast black. Legs fulvous.

Male. Antennæ with joints 3rd to 5th somewhat thickened. Femora of middle legs with a small tubercle on the ventral side a little below the middle of its length; tibiæ of the same dilated for nearly their distal two-thirds.

Var. A. In specimens from Bahia, which do not seem to differ in any other particular from typical examples from Rio Janeiro, the sixth to eighth joints of the antennæ, instead of the eighth to tenth, are pale fulvous.

Var. B. Elytra with an elongate-triangular spot on each shoulder, a common elongate sutural spot behind the scutellum, and two spots on each posteriorly, black.

Var. C. Differs from type in wanting the posterior spot on the disk of each elytron. This variety is represented in the B. M. collection by a single specimen from Santa Cruz, Brazil.

84. *Diabrotica dulcis*, Gahan, n.n.

Diabrotica amœna, Baly MS., nec Dalm., nec Baly, Trans. Ent. Soc. Lond., 1890, p. 45.

Anguste ovata, postice paullo ampliata, convexa, fulva, nitida, tibiis, tarsis, pectore capiteque nigris; antennis piceo-nigris, basi

fulvo-piceis, articulis octavo nonoque albidis; thorace quam longo latiori, disco sulco arcuato, et ante sulcum fovea magna male definita impresso; elytris rude punctatis, viridi-metallicis, limbo externo, apice dilatato, fascia prope medium, lineaque suturali pone medium flavis.

Long. 6 mm.

Hab. Cayenne.

Head not broader than long, triangular; clypeus with a strongly raised longitudinal ridge, excavated on the sides, impunctate, the lateral angles piceous; antennæ slender, filiform, longer than the body, the second joint short, subovate, the third nearly twice its length, the fourth distinctly longer than the third; the four lower joints obscure piceo-fulvous, the eighth and ninth white. Thorax about one-fourth broader than long; sides rather broadly margined, sinuate and slightly diverging from the base to beyond the middle, thence slightly converging towards the apex, the anterior angles subacute, hinder ones acute; upper surface convex, flattened on the hinder disk, the latter with a broad, shallow, and ill-defined curved depression, immediately in front of which, on the anterior disk, is a shallow excavation; surface remotely punctured. Elytra oblong-ovate, dilated posteriorly, regularly rounded at the apices, convex, longitudinally depressed along the suture, coarsely punctured, very sparingly clothed with suberect hairs. [Baly.]

85. *Diabrotica spectanda*, Baly.

Journ. Linn. Soc., xix., p. 241.

Hab. Colombia.

86. *Diabrotica fasciatipennis*, sp. n.

Oblongo-ovata, postice paullo ampliata; capite nigro; antennis nigris articulis ultimis quatuor flavis; prothorace transverso, testaceo-flavo, nitido, disco leviter bifoveolato; elytris dense punctulatis, pallide flavis, basi late et fascia transversa pone medium nigris, corpore subtus, prothorace excepto, tibiis tarsisque et apicibus femorum nigris. Long. 7½ mm.

Var. Femoribus totis nigris.

Hab. Venezuela (*Dyson*), (type); Colombia, Cauca (var.).

Head black, the front with a median carina passing from the clypeal margin to between the insertion of the antennæ. Antennæ black, with the last four joints, the tip of the eleventh excepted, yellowish; with the third joint at least twice as long as the second,

with these two together slightly longer than the fourth. Prothorax transverse, nitid, testaceous yellow; the sides slightly and gradually diverging for about two-thirds of the way from the base, thence converging to the apex; the disk with two shallow foveolate depressions. Elytra thickly and finely punctured, with the punctures thicker and somewhat stronger towards the middle; pale yellow, with the basal fourth (somewhat broader along the suture) and a transverse band behind the middle, black. The under side of the body, the prothorax excepted, the tibiæ, and tarsi, black. Femora yellow, with the tips of the posterior and the upper side of the apical half of the four anterior femora black.

In the specimen from Colombia the legs, excepting the anterior coxæ, are entirely black.

87. *Diabrotica insignita*, Baly.

Journ. Linn. Soc., xix., p. 256.

Hab. Colombia.

88. *Diabrotica Borrei*, Baly.

Ent. Mo. Mag., xxv., p. 253.

Anguste oblongo-ovata, postice paullo ampliata, convexa, nigra, nitida, femoribus antennis apice thoraceque flavis, hoc quam longo fere duplo latiori, lævi, dorso bifoveolato; elytris subcrebre punctatis, limbo externo, apice dilatato, fascia lata prope medium suturaque postice flavis.

Long. 6—6½ mm.

Hab. Brazil, Tejuca, Petropolis (*Gray*).

Head wedge-shaped, slightly longer than broad; clypeus clothed with adpressed sinuous hairs, transverse, its upper surface with a broad longitudinal ridge; antennæ filiform, nearly equal to the body in length, the second joint short, oblong, the third nearly twice its length, the fourth about one-third longer than the third; the four upper joints, the extreme apex of the eleventh, yellowish white. Thorax nearly twice as broad as long; sides straight and nearly parallel from the base to beyond the middle, thence obliquely converging towards the apex, the hinder angle slightly produced, acute; upper surface shining, nearly impunctate, middle disk with two large, shallow, ill-defined foveæ. Elytra broadly oblong, scarcely dilated posteriorly, obtusely rounded at the apex; convex, distinctly punctured. [Baly.]

D. cruciata, Baly (Ent. Mo. Mag., xxv., p. 253) is merely a variety of this species.

89. *Diabrotica perspicua*, Baly.

P. Z. S., 1889, p. 94.

Oblongo-ovata, postice paullo ampliata, convexa, flavo-fulva, nitida, antennis nigris, basi piceis, articulis apicalibus tribus, ultimi apice excepto, fulvis; thorace transverso, disco late transversim impresso, sulco utrinque dilatato et magis fortiter impresso; elytris crebre punctatis, nigris, limbo externo fasciaque prope medium flavo-fulvis.

Var. A. Elytrorum fascia centrali ad suturam abbreviata.

Long. $5\frac{1}{2}$ mm.

Hab. Amazons, Ega (*Bates*).

Antennæ slender, filiform, rather longer than the body, the second joint short, cylindrical, the third nearly twice its length, the fourth slightly longer than the third; the four lower joints piceous or piceo-fulvous, the three upper ones, the apex of the eleventh excepted, fulvous, the rest black. Thorax nearly twice as broad as long; sides nearly straight and parallel from the base to the middle, thence rounded and converging towards the apex; disk impressed with a broad transverse sulcation, which is dilated on either side into a large shallow fovea. Elytra broadly oblong, slightly dilated posteriorly, regularly rounded at the apex, convex, transversely depressed below the basilar space, closely and finely but distinctly punctured, outer disk below the humeral callus longitudinally grooved. [Baly.]

90. *Diabrotica alcyone*, Baly.

P. Z. S., 1889, p. 94.

Late ovata, modice convexa, fulva, nitida, pedibus (femoribus apice exceptis) antennisque piceo-nigris, his extrorsum piceis; thorace transverso, minute subremote punctato, disco bifoveolato; elytris tenuiter sed distincte punctatis, nigris, limbo externo fasciaque prope medium fulvis.

Var. A. Elytrorum fascia discoidali obsoleta.

Long. 6 mm.

Hab. Amazons (*Bates*).

Head triangular; clypeus broader than long, slightly swollen on the disk; antennæ slender, filiform, the second joint short, oblong, the third nearly twice its length, the fourth rather longer than the third; the four or five lower joints nigro-piceous, the rest pale piceous. Thorax nearly twice as broad as long; sides rather broadly margined, parallel and sinuate from the base to the middle,

thence obliquely rounded and converging towards the apex, the anterior angles obtuse, the hinder ones acute; upper surface minutely and remotely punctured, disk impressed with two large shallow foveæ. Elytra broadly ovate, rather broadly margined, regularly rounded at the apex; upper surface moderately convex, slightly depressed below the humeral callus, the latter obsoletely thickened; surface distinctly but not very closely punctured. [Baly.]

91. *Diabrotica diversa*, Gahan, n. n.

Diabrotica impressipennis, Baly MS.; nec Jac., Biol. C. A., Col., vi., p. 530.

Late ovata, modice conveva, fulvo-flava, nitida, antennis nigris, articulis apicalibus tribus, ultimo apice excepto, albidis, tibiis tarsisque piceo-tinctis; thorace transverso; utrinque vix pone medium obsolete foveolato; elytris tenuiter sed distincte punctatis, utrisque infra medium transversim impressis; nigris, apice flavis.

Long. 3 lin.

Hab. Amazons (*Bates*), Ecuador (*Buckley*).

Head triangular; clypeus scarcely broader than long, its surface transversely convex; antennæ slender, filiform, the second joint short, cylindrical, the third nearly twice its length, the fourth rather longer than the third; the basal joint more or less piceous on its lower half, the three upper ones, the apex of the eleventh excepted, yellowish white. Thorax nearly twice as broad as long at the base; sides rather broadly margined, slightly converging and slightly sinuate from the base to the middle, thence more quickly converging towards the apex, the anterior angles slightly produced, subacute; disk transversely convex, very remotely punctured, hinder disk impressed on either side with a large, shallow, ill-defined fovea. Elytra broadly subquadrate-ovate, slightly dilated posteriorly, their apices obtusely rounded; above moderately convex, transversely depressed below the basilar space, the latter slightly thickened; finely but not very closely punctured; on the outer disk of each elytron below the middle is a short, broad, but ill-defined transverse sulcation; running downwards from the humeral callus to this groove are two faintly raised longitudinal vittæ. [Baly.]

92. *Diabrotica simulans*, Baly.

P. Z. S., 1889, p. 93, nec Journ. Linn. Soc., xix. p. 222.

Late ovata, postice vix ampliata, modice convexa, dorso subdepressa, nigra, nitida, thorace capiteque fulvis, antennis nigris

extrorsum albidis; thorace transverso, sat profunde bifoveolato, foveis inter se connexis; elytris tenuiter subcrebe punctatis, infra basin non excavatis, limbo externo late fulvo.

Long. 5½ mm.

Hab. Amazons, Ega (*Bates*).

Antennæ slender, filiform, the second joint short, obconic, the third nearly twice its length, the fourth rather longer than the third; the five lower joints black, the six upper ones white. Thorax nearly twice as broad as long; sides sinuate and slightly diverging from the base to beyond the middle, thence rounded and converging towards the apex; upper surface obliquely deflexed on the sides, the latter rather broadly margined; disk with two large foveæ, which are connected with each other by a shallow depression. Elytra broadly oblong-ovate, scarcely dilated posteriorly, regularly rounded at their apices, moderately convex, slightly flattened on the suture, not excavated below the basilar space, minutely punctured; the outer limb broadly fulvous. [Baly.]

93. *Diabrotica albomarginata*, Baly.

P. Z. S., 1889, p. 92.

Late oblongo-ovata, postice ampliata, modice convexa, dorso subdepressa, nigra, nitida, antennarum articulis tertio ad nonum pallide flavo-fulvis (*duo apicales fracti sunt*); thorace fortiter arcuatim impresso, sulco utrinque magis excavato; elytris tenuiter punctatis, margine laterali late albido.

Long. 5½ mm.

Hab. Ecuador (*Buckley*); a single specimen.

Head not longer than broad, trigonate; clypeus convex, its upper two-thirds with a faint longitudinal ridge; antennæ robust, filiform, pubescent, the second joint short, cylindrical, increasing in thickness towards the apex, the third nearly twice its length, the fourth nearly as long as the preceding two united; the two lower joints black, the third to the ninth pale flavo-fulvous (the two upper ones broken off). Thorax more than one-third broader than long; sides broadly margined, straight and parallel from the base to the middle, thence obliquely converging to the apex, the anterior angles obtuse, the hinder ones subacute; upper surface finely but not closely punctured; disk impressed with a large, shallow, ill-defined, curved sulcation, either end of which is more deeply foveolate. Elytra ovate, their lateral limb broadly dilated, their apices conjointly regularly rounded; moderately convex, slightly flattened along the suture, minutely and subremotely punctured. [Baly.]

94. *Diabrotica albocincta*, Baly.

P. Z. S., 1889, p. 93.

Anguste ovata, postice ampliata, convexa, nigra, nitida, thorace lateribus lati, elytrorum limbo externo apice dilatato, fasciaque angusta vix pone medium, albidis; thorace bifoveolato.

Long. $5\frac{1}{2}$ mm.

Hab. Peru.

Antennæ filiform, the second joint short, moniliform, the third more than twice as long, equal in length to the fourth; eight lower joints black (the rest in the only specimen before me are broken off). Thorax rather more than one-half broader than long; sides nearly straight and parallel from the base to beyond the middle, thence slightly narrowed obliquely to the apex; disk transversely convex, impressed on either side with a deep round fovea. Elytra oblong, dilated posteriorly, regularly rounded at the apex, convex, slightly flattened on the suture below the basilar space, finely punctured. [Baly.]

95. *Diabrotica albopicta*, Baly.

P. Z. S., 1889, p. 93.

Anguste ovata, postice ampliata, convexa, flavo-fulva, nitida; tibiis, tarsis, pectore, scutello capiteque nigris; antennis basi piceo-fulvis, articulis penultimis duobus albidis; thorace quam longo plus dimidio latiori, disco leviter trifoveolato; elytris subrugulosis, rude punctatis; nigris, utrisque macula infra basin, altera ante apicem fasciaque prope medium, utrinque abbreviata, albidis.

Long. $5\frac{1}{2}$ mm.

Hab. Peru; a single specimen.

Head not longer than broad, triangular; clypeus with a strongly raised longitudinal ridge, which extends as far as the anterior margin, the latter thickened, space on either side concave, closely covered with fine punctures; antennæ filiform, the second joint short, oblong, the third and fourth equal in length, each twice as long as the second; the five lower joints piceo-fulvous, the antepenultimate and penultimate white, the rest black. Thorax more than one-half broader than long; sides broadly margined, straight and parallel from the base to the middle, thence obliquely rounded and converging towards the apex; upper surface moderately convex, impressed with three shallow ill-defined foveæ, one small and oblong-ovate, placed a short distance in front of the basal, and two,

one on either side the central disk, larger and subrotundate. Elytra ovate, dilated posteriorly, regularly rounded at the apex, convex, not excavated below the basilar space, coarsely and irregularly punctured, their interspaces irregularly rugulose; surface on the sides and towards the apex sparingly clothed with fine suberect hairs, visible only under a lens. [Baly.]

96. *Diabrotica zonula*, Baly.

P. Z. S., 1889, p. 92.

Sat late ovata, postice ampliata, modice convexa, nigra, nitida, antennis extrorsum albidis, thorace flavo-fulvo, obsolete bifoveolato; elytris distinct minus crebre punctatis, limbo externo, apice paullo ampliato, fasciaque prope medium flavo-fulvis.

Long. 6½ mm.

Hab. Ecuador (*Buckley*).

Head scarcely longer than broad, triangular; clypeus convex, the longitudinal ridge obsolete; antennæ slender, filiform, the second joint short, oval, the third twice its length, the fourth slightly but distinctly longer than the third; the four upper joints yellowish white, the rest black. Thorax nearly twice as broad as long; sides nearly parallel and slightly sinuate from the base to just beyond the middle, thence slightly converging obliquely towards the apex, anterior angles obtuse, the hinder ones slightly produced, subacute; disk transversely convex, the middle disk faintly impressed on either side with a large, very shallow, fovea, Elytra rather strongly dilated posteriorly, moderately convex. faintly excavated on the suture, rather strongly but not closely punctured. [Baly.]

97. *Diabrotica unifasciata*, Baly.

P. Z. S., 1889, p. 92.

Late ovata, postice ampliata, modice convexa, dorso subdeplanata, nigra, nitida, thorace obsolete bifoveolato, albido; elytris tenuiter remote punctatis, limbo externo apice distincte ampliato, fasciaque prope medium albidis.

Long. 6½ mm.

Hab. Peru, Chanchamayo.

Head not longer than broad, triangular; clypeus slightly excavated on either side, its medial with an elevated ridge; antennæ filiform, the second joint short, ovate, the third twice the length of the second, the third and fourth nearly equal. Thorax twice as broad as long; sides rather broadly margined, straight and parallel

from the base to just beyond the middle, thence very slightly converging towards the apex; disk transversely convex, slightly flattened on the middle, impressed on either side with a large, very shallow, ill-defined fovea, the anterior and hinder angles slightly produced, the former obtuse, the latter subacute. Elytra dilated posteriorly, broadly rounded at the apices, rather broadly margined, moderately convex, flattened along the suture, transversely excavated below the basilar space, very finely and distantly punctured. [Baly.]

98. *Diabrotica discrepans*, Baly.

P. Z. S., 1889, p. 94.

Oblongo-ovata, postice paullo ampliata, convexa, nigra, nitida, thorace capiteque sordide rufis, pedibus antennisque flavis, his apice piceis; thorace quam longo plus dimidio latiori, minute sed distincte punctato, disco sulco semilunato, medio ramulo fere ad basin emittente, impresso; elytris subcrebre punctatis, limbo externo ante medium limbo apicali, fasciaque prope medium flavis,

Fœm. Clypeo quam longo latiori, medio sat fortiter elevato-vittato.

Long. $2\frac{3}{4}$ lin.

Hab. Ecuador (*Buckley*).

Clypeus broader than long in the ♀ (the only sex known to me), divided in the medial line; which extends downwards nearly to the apical margin; antennæ filiform, the second joint short, oblong, the third nearly twice its length, the fourth slightly longer; flavous, the apical joint stained with piceous. Thorax more than one-half broader than long; sides rather broadly margined, nearly straight and parallel from the base to just beyond the middle, thence converging towards the apex; upper surface finely punctured, disk impressed with a curved broad but ill-defined sulcation, its concavity looking forwards; from its middle a short longitudinal space runs backwards nearly to the basal margin. Elytra subquadrate-ovate, dilated posteriorly, convex, rather closely punctured; the anterior half of the outer limb, the apical margin, and a transverse band across the middle, pale flavous. [Baly.]

99. *Diabrotica mimula*, Harold.

Coleopt., Hefte xiii., p. 92.

Hab. Colombia.

100. *Diabrotica beata*, Baly.

Journ. Linn. Soc., xix., p. 244.

Hab. Colombia.

101. *Diabrotica subsimilis*, Baly, sp. n.

Ovata, postice ampliata, sat valde convexa, nigra, nitida, capite thoraceque rufis, antennis pedibusque flavis; thorace tenuiter punctato, utrinque foveolato, foveis inter se convexis; elytris postice ampliatis apice obtuse truncatis; convexis, postice subventricosis, subfortiter punctatis, obsolete elevato-vittatis; fascia mediali ad marginem abbreviata apiceque flavis.

Fœm. Clypeo convexo, basi obsolete costato.

[Mas. Facie profunde transversim excavata.]

Long. 6—7 mm.

Hab. Colombia, Cauca.

Head distinctly longer than broad, subtrigonate; clypeus in the ♀ convex, its extreme base indistinctly elevate-vittate; antennæ slender, filiform, four-fifths the length of the body, the second joint filiform, slightly thickened towards its apex, nearly equal in length to the third, the fourth nearly as long as the preceding two united. Thorax nearly one-half broader than long at the base; sides sinuate behind the middle, rounded and converging towards the apex anteriorly, the hinder angles rather strongly produced, subacute; above convex, distinctly but rather distantly punctured, disk impressed on either side with a deep fovea, the foveæ connected by a transverse sulcation. Elytra broadly ovate, strongly dilated posteriorly, the apices conjointly obtusely rounded; above convex, more strongly so below the middle, transversely impressed at the suture below the basilar space, rather strongly but not very closely punctured; disk of each elytron with several ill-defined longitudinal ridges, the spaces between which are obsoletely sulcate.

Although this species differs in the relative length of the second and third joints of the antennæ, it agrees so closely in general form, coloration, and other characters, with the insects of the present section, that I have placed it amongst them. [Baly.]

102. *Diabrotica bella*, Baly.

L. c., p. 247.

Hab. Colombia, Magdalena River.

103. *Diabrotica excelsa*, Baly.

Ent. Mo. Mag., xxv., p. 254.

Ovata, postice ampliata, sat valde convexa, nigra, nitida, capite thoraceque rufo-fulvis aut fulvo-piceis; pedibus antennisque flavis, his apice tarsisque piceis; thorace lævi sat profunde bifoveolato; elytris distincte punctatis, obsolete elevato-vittatis; fascia mediali ad marginem abbreviata apiceque flavis.

Mas. Facie inferiori profunde excavata, antennis simplicibus.

Fœm. Clypeo convexo, basi obsolete costato.

Long. 9½ mm.

Hab. Colombia, Cauca (*Staudinger*).

Head longer than broad, somewhat wedge-shaped; clypeus in the ♂ entirely covered with a deep, smooth, concave excavation; the same segment in the ♀ convex, its extreme base with an indistinct longitudinal ridge; antennæ simple in both sexes, four-fifths the length of the body, filiform, the second joint short, the third and fourth equal in length, each more than twice as long as the second, the fourth cylindrical, not curved, the three or four outer joints more or less stained with piceous; apices of the joints black. Thorax about one-third broader than long; sides rounded, sinuate behind the middle, converging anteriorly towards the apex, the hinder angles produced, subacute; above convex, smooth, impunctate; disk impressed on either side with a deep fovea. Elytra broadly ovate, strongly dilated towards the apex, their apices conjointly obtusely rounded; above convex, subventricose behind the middle, transversely depressed below the basilar space, rather strongly but not very closely punctured, the puncturing at the base subseriate; on the disk of each elytron are several obsoletely raised longitudinal lines.

The above insect, of which I only know a single male and female, may be known from its congeners by its larger size, and more strongly punctured elytra. From *D. subsimilis*, with which species it agrees in the punctuation of its elytra, it differs in the relative length of the third and fourth joints of the antennæ. [Baly.]

104. *Diabrotica Gestroi*, Baly.

Ent. Mo. Mag., xxv., p. 253.

Ovata, postice ampliata, valde convexa, nigra, nitida; thorace capiteque rufo-fulvis, pedibus antennisque flavis, thorace minute

punctato, utrinque foveolato; elytris late oblongo-ovatis, postice ampliatis, apice subtruncatis, sat valde convexus, tenuiter sed distincte subcrebre punctatis, fascia communi prope medium, ad marginem abbreviata, margineque apicali flavis.

Mas. Facie inferiori profunde excavato, concavo, antennis simplicibus.

Fœm. Clypeo convexo, punctis majoribus nonnullis impressis, basi longitudinaliter carinato.

Long. 5½—7 mm.

Hab. Eastern Peru, Ecuador.

Antennæ slender and filiform in both sexes, the second joint short, oblong, the third twice its length, rather longer in the ♂, the third and fourth joints nearly equal; flavous, the four upper joints slightly stained with piceous. Thorax about one-fourth broader than long at the base; sides slightly converging and slightly sinuate from the base to the middle, thence more quickly converging towards the apex; upper surface moderately convex, minutely but not closely punctured, the punctures only visible under a lens; disk impressed on either side with a deep fovea. Elytra broadly oblong, dilated posteriorly, their apices very obtusely rounded, conjointly subtruncate; above rather strongly convex, slightly depressed on the suture below, the basilar space finely but distinctly punctured. [Baly.]

105. *Diabrotica Stevensi*, Baly.

Journ. Linn. Soc., xix., p. 248.

Cerotoma Deyroleii, Baly, Trans. Ent. Soc. Lond., 1866, p. 477.

Hab. Colombia, Magdalena River; Venezuela, Bogota.

106. *Diabrotica imitans*, Jacoby.

P. Z. S., 1879, p. 791.

Hab. Venezuela.

107. *Diabrotica Jekelii*, Baly.

Journ. Linn. Soc., xix., p. 246.

Hab. Colombia.

108. *Diabrotica fenestrata*, Baly.

Journ. Linn. Soc., 1886, p. 250.

Hab. Venezuela, Merida.

109. *Diabrotica caviceps*, Baly.

Ent. Mo. Mag., xxv., p. 253.

Oblonga-ovata, postice ampliata, convexa, nigra, nitida, pedibus capiteque flavis, antennis extrorsum piceo-tinctis; thorace rufo-testaceo, minute subremote punctato, utrinque foveolato; scutello piceo aut piceo-nigro; elytris convexis, distincte subcrebre punctatis, basi, limbo externo apice paullo dilatato, fasciaque communi prope medium flavis.

Mas. Clypeo profunde excavato, convexo; antennis simplicibus, filiformibus.

Fœm. Clypeo convexo, basi longitudinaliter elevato-vittato, punctis majoribus sparse impresso.

Var. A. Thorace scutelloque flavis, elytrorum plaga basali obsoleta.

Var. B. Elytrorum fascia mediali ad marginem abbreviata.

Long. 5—6 mm.

Hab. Amazons, Para, Santarem (*Bates*).

Lower face deeply excavated and concave in the ♂, transversely convex in the ♀, its upper portion with a slightly raised longitudinal ridge, the surface sparingly impressed with large punctures; antennæ filiform in both sexes, the second joint short, oblong-ovate, the third more than twice its length, the third and fourth equal, the latter very slightly curved in the ♂. Thorax about one-fourth broader than long; sides nearly straight and parallel from the base to beyond the middle, thence obliquely converging towards the apex; above convex, very minutely punctured, disk impressed on either side with a subrotundate fovea. Elytra subquadrate-ovate, dilated posteriorly, their apices obtusely rounded; above convex, distinctly but finely punctured. [Baly.]

110. *Diabrotica conchula*, Erichs.

Wiegm. Archiv., 1847, i., p. 168.

Ovata, postice ampliata, sat valde convexa, flava, nitida, corpore subtus, pedibus exceptis, nigris, capite thoraceque plus minusve rufo-tinctis aut totis rufis, scutello piceo; thorace lævi, bifoveolato; elytris tenuiter punctatis, utrisque fasciis duabus latis una infra basin altera pone medium nigris.

Mas. Facie inferiori profunde excavata, antennarum articulo quarto leviter curvato.

Fœm. Clypeo convexo, basi longitudinaliter costato; antennis filiformibus.

Long. 6—7 mm.

Hab. Peru, Chanchomayo; Bolivia, Amazons (*Bates*).

Head rather longer than broad, subtrigonate; clypeus in the ♂ entirely occupied by a large concave fovea, convex in the ♀, its upper half with a distinct longitudinal ridge; antennæ slender, filiform, the third and fourth joints equal, each twice the length of the second, the fourth in the ♂ slightly curved. Thorax nearly one-half broader than long; sides nearly straight and parallel behind the middle, thence rounded and converging towards the apex, the hinder angles acute; above convex, smooth, impunctate; disk impressed on either side with an oblique fovea. Elytra broadly ovate, dilated posteriorly, their apices conjointly obtusely rounded; upper surface strongly convex, faintly excavated transversely below the basilar space, finely punctured; each elytron with two transverse bands abbreviated on the outer margin, less distinctly so on the suture; the first extends from below the base nearly to the middle, the second from the middle nearly to the apex; the elytra may be described as black, with the base, more or less broadly, a narrow sutural line, the outer limb, and a medial fascia, flavous. [Baly.]

111. *Diabrotica jucunda*, Baly.

Journ. Linn. Soc., xix., p. 247.

Hab. Colombia.

112. *Diabrotica læta*, Fabr.

Syst. Ent., i., p. 454; Baly, *l. c.*, p. 258.

113. *Diabrotica tarsata*, Gahan, n. n.

Diabrotica tarsalis, Baly, Ent. Mo. Mag., xxv., p. 254, nec Harold.

Oblongo-ovata, postice ampliata, convexa, pallide flava, nitida; pectore, abdomine, antennis apice scutelloque nigris, mandibulis apice, coxisque piceis; thorace minute punctato, dorso leviter biimpresso; elytris distincte sat crebre punctatis; nigris, limbo externo, apice paullo dilatato, fasciaque communi prope medium pallide flavis.

Mas. Tibiis anticis a basi ad apicem incrassatis, tarsorum anticorum articulo basali ampliato, transverso-quadrato.

Long. 5 mm.

Hab. Bahia; a single specimen.

Head longer than broad; clypeus in the ♂ large, subquadrate, its disk smooth, concave; antennæ slender, filiform, the second joint short, oblong, the third more than twice its length, nearly as long as the fourth, pale flavous, the five outer joints black, the two basal ones stained above with piceous. Thorax broader than long; sides straight and nearly parallel from the base to beyond the middle, thence obliquely converging towards the apex; upper surface very finely punctured, the punctures only visible under a lens, middle disk with two obliquely placed oblong foveæ. Elytra broadly oblong, dilated posteriorly, obtusely rounded at the apex; above convex, slightly excavated on the suture below the basilar space, distinctly and rather closely punctured. [Baly.]

114. *Diabrotica quadriplagiata*, Boh.

Eugen. Res., p. 179.

Oblongo-ovata, postice ampliata, convexa, flava, nitida, pectore scutello, antennisque extrorsum nigris, his basi apiceque piceis, abdomine piceo-tincto; thorace quam longo latiori, minute punctato, utrinque foveolato; elytris sat crebre punctatis, fulvis, utrisque plaga magna subquadrata a basi ad medium extensa, interdum disco fulvo-notata, alteraque pone medium, subrotundata, nigris.

Var. A. Elytrorum plaga antica nigra intus profunde emarginata.

Long. 5—6 mm.

Hab. Brazil, Rio Janeiro, Bahia.

Head triangular; clypeus in the ♀ (the only sex known to me) not longer than broad, slightly convex, its basal portion with a slightly raised longitudinal ridge; antennæ filiform, the second joint short, oblong, the third more than twice its length, as long as the fourth; the two lower joints piceous, the six upper ones, the basal half of the first of these excepted, black. Thorax nearly one-fourth broader than long; sides nearly straight and parallel from the base to the middle, thence rounded and converging towards the apex; upper surface finely punctured, disk impressed with two oblong foveæ, placed obliquely on either side. Elytra broadly oblong-ovate, dilated posteriorly, their apices obtusely rounded; above convex, slightly depressed on the suture below the basilar space, rather strongly punctured. [Baly.]

115. *Diabrotica clypeata*, Baly.

Journ. Linn. Soc., xix., p. 249.

Hab. Colombia.

116. *Diabrotica deliciosa*, Baly.

Journ. Linn. Soc., xix., p. 251.

Hab. Colombia; a single specimen.

117. *Diabrotica xanthoptera*, Baly.

Journ. Linn. Soc., 1886, p. 250.

Hab. Colombia, Magdalena River.

118. *Diabrotica sordidipennis*, Baly.

Ent. Mo. Mag., xxv., p. 253.

Anguste-ovata, postice ampliata, convexa, nigra, nitida; capite thoraceque piceis; antennis basi, pedibus elytrisque sordide flavis; thorace sat profunde bifoveolato; elytris sat fortiter subcrebre punctatis.

Mas. Antennis filiformibus; clypeo profunde excavato.

Long. 8½ mm.

Hab. Colombia, Cauca; a single specimen.

Head longer than broad, wedge-shaped, its surface in the ♂ (the only sex known to me) entirely occupied by a deep, concave, smooth excavation; antennæ nearly four-fifths the length of the body, filiform, the second joint short, obovate, the third more than twice its length, nearly equal to the fourth, the latter simple, not curved. Thorax about one-third broader than long; sides rounded, nearly straight and obliquely diverging from the base to the middle, the hinder angles produced, subacute; above convex, finely punctured, disk impressed on either side with a large deep fovea. Elytra ovate, dilated posteriorly, their apices conjointly obtusely rounded, strongly convex, rather coarsely punctured.

Closely allied to *D. xanthoptera;* separated by its larger size, and by the more strongly punctured elytra. [Baly.]

119. *Diabrotica reticulata*, Baly.

Ent. Mo. Mag., xxv., p. 254.

"Late ovata, ventricosa, picea, femoribus fulvis; thorace lateribus angulatis, disco lævi, profunde bifoveolato; elytris basin trans-

versim depressis, foveolato punctatis, interspatiis incrassatis, rete elevatum formantibus." Long. 10 mm.

Hab. Colombia, Cauca.

This species may be easily recognised by the large foveolate punctures of the elytra, with the interspaces raised, and forming a coarse reticulated corrugation.

120. *Diabrotica corrugata*, Baly.

Ent. Mo. Mag., xxv., p. 254.

Ovata, postice ampliata, convexa, nitida, subtus nigra, pedibus flavis, tarsis duobus ultimis piceis; supra pallide fulvo-picea, antennis extrorsum labroque piceis, oculis scutelloque nigris; thorace fere impunctato, disco arcuatim sulcato, sulco trifoveolato; elytris infra basin transversim depressis, tenuiter punctatis, disco laxe et irregulariter elevato-corrugatis.

Long. 9½ mm.

Hab. Colombia, Cauca; a single specimen.

Head longer than broad, broadly wedge-shaped; antennæ filiform, nearly as long as the body, the relative length of the joints as in *D. tortua*, the four outer ones piceous. Thorax one-third broader than long; sides parallel, slightly produced and rounded before the middle, slightly sinuate posteriorly, the hinder angles acute, the anterior ones armed with an obtuse flattened tubercle; upper surface convex, minutely punctured on the sides, medial disk nearly impunctate; hinder disk with a transverse curved sulcation, the surface of which is distinctly trifoveolate. Elytra similar in form and sculpture to *D. tortua*.

This species is very closely allied to the following one, but may be separated by the different coloration of the upper surface of the body and antennæ, and by the transversely sulcate thorax. [Baly.]

121. *Diabrotica tortua*, Baly.

Diabrotica torta, Ent. Mo. Mag., xxv., p. 254.

Ovata, postice ampliata, convexa, nigra, nitida, femoribus flavis, antennis extrorsum, elytrisque apice sordide fulvis; thorace trifoveolato, minute punctato; elytris infra basin transversim excavatis, sat crebre punctatis, disco irregulariter corrugatis.

Long. 9½ mm.

Hab. Colombia, Cauca.

Head longer than broad, wedge-shaped; clypeus with a strongly raised longitudinal ridge, the surface on either side finely rugulose, rather shorter than the body, filiform, the second joint half the length of the basal one, the third twice as long as the second, the rest each nearly equal in length to the fourth, the four outer joints obscure fulvous, the apical darker than the three others. Thorax one-third broader than long; sides parallel, very slightly produced before the middle, subsinuate behind the latter; the hinder angles, the anterior ones with an obtuse tubercle; disk convex, finely but remotely punctured, impressed with three round foveæ, placed one on either side, and the third, rather smaller, on the medial line near the base. Elytra oblong-ovate, dilated posteriorly, their apices conjointly regularly rounded; above convex, subventricose posteriorly, transversely excavated below the basilar space, distinctly and somewhat closely punctured; disk below the base with a number of rather strongly raised irregular wrinkles, which disappear towards the apex of the elytron. [Baly.]

122. *Diabrotica rugulosa*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 450.

Hab. Eastern Ecuador.

123. *Diabrotica assimilis*, Gahan, sp. n.

Atro-cyanea, femoribus antennisque flavescentibus, his apice infuscatis; prothoracis dorso bifoveolato, subsparsim minuteque punctato; elytris crebre fortiterque rugoso-punctatis, cyaneis (vel olivaceo-tinctis), epipleuris antice et macula marginali utrinque ante medium sordide flavis. Long. $7\frac{1}{2}$—$8\frac{1}{2}$ mm.

Hab. Ecuador (*Buckley*).

This species closely resembles *D. rugulosa*, Baly, but differs from it by the following characters:— Prothorax less strongly punctured, the foveæ of its disk joined by means of a feeble transverse depression. Elytra without raised longitudinal lines on the disk, with their epipleures rather broader and flatter, yellowish in their anterior two-thirds; with a yellowish spot just before the middle of the lateral margin of each elytron. Femora and antennæ yellowish rather than greenish; the third joint of the latter shorter than the fourth, and nearly twice as long as the second. Hind breast without a patch of golden pubescence on each side.

124. *Diabrotica marginicollis*, Gahan, sp. n.

Capite prothoracisque dorso (hoc margine laterali excepto) atro-cyaneis; prothorace dense distincteque punctato, utrinque leviter foveolato; scutello nigro; elytris fortiter rugoso-punctatis, purpureo-rufescentibus; corpore subtus (prothorace flavo excepto) tibiis tarsisque nigris; femoribus antennisque flavescentibus. Long. 8 mm.

Hab Colombia.

Head blue-black; front carinate along the middle, punctured at each side below the insertion of the antennæ; vertex with a median fovea between the eyes. Prothorax transverse; sides nearly parallel; disk thickly and distinctly punctured, with a fovea on each side, and a short feeble median longitudinal impression close to the base, its colour dark blue, with the narrow reflexed lateral borders yellowish, like the under side. Scutellum black, nitid, impunctate. Elytra closely, strongly, and somewhat rugosely punctured; dark red with a purplish tint.

This species has at first sight a strong resemblance to *D. chrysopleura*, Harold (Sect. I.). The coloration of the elytra is almost exactly the same in both species. Harold has described this colour as obscure purple, but Baly (Trans. Ent. Soc. Lond., 1890, p. 85) thought it better described as "rufous, more or less stained with piceous."

125. *Diabrotica hebe*, Baly.

Trans. Ent. Soc. Lond., 1865, p. 348; Journ. Linn. Soc., xix., p. 241.

Hab. Colombia.

126. *Diabrotica gibbosa*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 450.

Hab. Ecuador.

127. *Diabrotica opacipennis*, Baly.

Ann. and Mag. Nat. Hist., 5th ser., iii., p. 182.

Hab. Ecuador.

128. *Diabrotica erythroptera*, Baly.

P. Z. S., 1889, p. 95.

Ovata, postice ampliata, convexa, nigra, nitida, elytris rubris; thorace arcuatim sulcato, sulco trifoveolato; elytris crebre punctatis.

Long. 7½ mm.

Hab. Peru, Chanchomayo (*Thamm*).

Head triangular, slightly longer than broad; clypeus with a longitudinal ridge; antennæ equal to the body in length, filiform, the second joint short, subovate, the third more than twice its length, slightly shorter than the fourth. Thorax rather more than one-half broader than long; sides rather broadly margined, nearly straight and slightly diverging from the base to beyond the middle, thence rounded and converging towards the apex; upper surface shining, nearly impunctate, hinder disk with a deep curved sulcation, the surface of which is trifoveolate. Elytra broadly ovate, dilated posteriorly, regularly rounded conjointly at the apex; convex, faintly depressed below the basilar space, rather strongly punctured. [Baly.]

129. *Diabrotica sanguineipennis*, Baly, sp. n.

Ovata, postice ampliata, convexa, nigra, nitida, elytris rubris; thorace trifoveolato; elytris subcrebre punctatis.

Long. 7½ mm.

Hab. Peru, Chanchomayo (*Thamm*).

Head triangular, distinctly longer than broad; clypeus with a longitudinal ridge; vertex with a very large deeply impressed fovea; antennæ with the second joint short, obovate (the rest in the single specimen before me broken off). Thorax nearly twice as broad as long across the middle; sides rather broadly margined, slightly rounded and diverging from the base to beyond the middle, thence rounded and converging towards the apex; apical angle produced, slightly thickened, subacute, the hinder ones acute; above convex, subremotely punctured; disk just behind the middle impressed on either side with a large rounded fovea; between the two, just in front of the basal margin, is another, shallow and ill-defined. Elytra oblong-ovate, dilated posteriorly, regularly rounded conjointly at the apex; above convex, subventricose, not excavated below the basilar space, rather strongly punctured, the puncturing rather more crowded than in *D. rubripennis*, Erichs. [Baly.]

130. *Diabrotica rubripennis*, Erichs.

Wiegm., Archiv., 1847, i., p. 168.

Ovata, postice ampliata, convexa, nigra, nitida, elytris rubris thorace bifoveolato; elytris subcrebre punctatis.

Long. 5½—6½ mm.

Hab. Peru, Chanchomayo (*Thamm*).

Head triangular, scarcely longer than broad; clypeus with a strongly elevated ridge; antennæ nearly equal to the body in length, filiform, the second joint short, oblong, the third twice its length, equal to the fourth. Thorax nearly twice as broad as long; sides slightly rounded and diverging from the base to beyond the middle, thence rounded and converging towards the apex, the anterior angles slightly produced, subacute, the hinder angles acute; disk impressed on either side with two large deep foveæ, separated from each other by a narrow space. Elytra gradually dilated posteriorly, rounded conjointly at their apices; convex, not excavated below the basilar space, distinctly but not coarsely punctured. [Baly.]

131. *Diabrotica butleri*, Baly.

Journ. Linn. Soc., xix., p. 251.

Hab. Colombia.

132. *Diabrotica dimidiatipennis*, Baly.

Trans. Ent. Soc. Lond., 3rd ser., vol. ii., p. 350.

Hab. Peru.

133. *Diabrotica intermedia*, Baly.

Journ. Linn. Soc., xix., p. 252.

Hab. Colombia.

134. *Diabrotica saundersi*, Baly.

Trans. Ent. Soc. Lond., 3rd ser., vol. ii., p. 350.

Hab. Ecuador, Quito.

135. *Diabrotica dimidiata*, Baly.

Ann. and Mag. Nat. Hist., 3rd ser., iv., p. 270.

Hab. Ecuador.

136. *Diabrotica divisa*, Baly.

Ann. and Mag. Nat. Hist., 5th ser., iii., p. 83

Hab. Ecuador.

137. *Diabrotica posticata*, Baly.

Journ. Linn. Soc., xix., p. 252.

Hab. Colombia.

138. *Diabrotica quadripunctata*, Gahan, sp. n.

Cerotoma quadripunctata, Buq. MS.

Late ovata, flavescens ; elytris atro-cyaneis, tertia basali (punctis quatuor atro-cyaneis exceptis) marginibusque externis flavis ; corpore subtus (abdomine nigro excepto), pedibus antennisque flavescentibus ; prothoracis dorso bi-impresso, impunctato, nitido ; elytris subventricosis sat dense punctulatis. Long. 6 mm.

Hab. Colombia.

Testaceous yellow. Antennæ with the third joint twice as long as the second, and equal in length to the fourth. Prothorax with its sides almost parallel, its disk impunctate, nitid, with two transverse impressions. Elytra bluish black, with the basal third (four blue-black points, of which one is over each shoulder, and one on the disk of each elytron a little behind the base, excepted), and the entire outer margin yellowish. Abdomen black.

139. *Diabrotica lugubris*, Baly.

Journ. Linn. Soc., xix., p. 253.

Hab. Colombia.

140. *Diabrotica dimidiaticornis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 451.

Hab. Ecuador.

141. *Diabrotica leucospila*, Baly.

Journ. Linn. Soc., xix., p. 253.

Hab. Colombia.

142. *Diabrotica socia*, Gahan, n. n.

Diabrotica tetraspilota, Baly, Journ. Linn. Soc., xix., p. 254, nec Baly, Trans. Ent. Soc., Lond., 1865, p. 351.

Hab. Colombia.

143. *Diabrotica tuberculata*, Baly.

P. Z. S., 1889, p. 91.

Sat late ovata, postice paullo ampliata, convexa, subtus scutello capiteque nigris, antennarum articulis ultimis quatuor sordide fulvis; thorace elytrisque flavis illo arcuatim excavato, utrinque puncto nigro parvo notato, his tenuiter punctatis, utrisque plagis magnis duabus, uno baseos, altera pone medium nigris.

Mas. Elytris utrisque prope suturam ante apicem tuberculo valido conico arcuatis.

Long. 6½ mm.

Hab. Eastern Ecuador (*Buckley*).

Head very slightly longer than broad, triangular; clypeus with a strongly raised longitudinal ridge; antennæ slightly equal to the body in length, filiform, very slightly attenuated towards the apex; the second joint short, obovate, the third twice its length, slightly longer than the fourth; black, the upper four joints piceo-fulvous. Thorax about one-third broader than long; sides rather broadly margined, straight and very slightly diverging from the base to beyond the middle, thence obliquely rounded and converging towards the apex: above convex, obliquely deflexed on the sides, hinder disk with a broad curved excavation, which is more deeply impressed on either side; just before the middle are two small round black spots. Elytra oblong-ovate, slightly dilated posteriorly, their apices rounded, conjointly sinuate at the sutural angle, convex, slightly excavated on the suture, below the basilar space finely but distinctly punctured; each elytron in the ♂ (the only sex known to me) with a large conical obtuse tubercle, placed close to the suture just before the apex. [Baly.]

144. *Diabrotica propinqua*, Baly.

Journ. Linn. Soc., xix., p. 255.

Hab. Colombia.

145. *Diabrotica robusta*, Baly.

Journ. Linn. Soc., xix., p. 255.

Hab. Colombia.

146. *Diabrotica imbuta*, Erichs.

Wieg. Archiv., 1847, i., p. 168.

Hab. Peru.

147. *Diabrotica hemixantha*, Baly.

P. Z. S., 1889, p. 91.

Ovata, postice ampliata, convexa, nigra, nitida, femoribus basi et subtus, thorace elytrorumque dimidio antico flavis; thorace leviter transversim sulcato; elytris distincte punctatis; punctis apicem versus fere deletis.

Var. A. Pedibus totis nigris.

Long. $6\frac{1}{2}$ mm.

Hab. Upper Amazons (*Staudinger*).

Head slightly longer than broad; clypeus convex, the longitudinal ridge obsolete; antennæ filiform, rather more than three-fourths the length of the body, the second joint short, the third twice its length, equally as long as the fourth. Thorax rather more than one-half broader than long; sides straight and parallel from the base to just beyond the middle, thence rounded and converging towards the apex; upper surface smooth, middle disk impressed with a broad transverse sulcation. Elytra broadly ovate, dilated posteriorly, their apices conjointly regularly rounded; above convex, distinctly punctured, the punctures below the middle nearly obsolete. [Baly.]

148. *Diabrotica spilothorax*, Harold.

Col., Hefte xiii., p. 185.

Diabrotica quadrivittata, Baly, Trans. Ent. Soc. Lond., 3rd ser., ii., p. 349.

149. *Diabrotica lata*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 451.

Hab. Peru.

150. *Diabrotica setifera*, Baly.

Trans. Ent. Soc. Lond., 1879, p. 257.

Hab. Peru.

151. *Diabrotica serraticornis*, Baly.

Journ. Linn. Soc., xix., p. 255.

Hab. Colombia.

152. *Diabrotica dilaticornis*, Baly.

Ann. and Mag. Nat. Hist., 5th ser., iii., p. 81.

Hab. Amazons.

153. *Diabrotica amplicornis*, Baly.

Trans. Ent. Soc. Lond., 1886, p. 446.

Hab. Brazil, Parana.

154. *Diabrotica melancholica*, Baly.

P. Z. S., 1889, p. 92.

Anguste ovata, postice ampliata, convexa, nigra, nitida, femoribus basi antennarumque articulo apicali flavo-albidis; thorace transverso, pone medium bifoveolato, nigro-piceo; elytris sat crebre punctatis, subrugulosis, punctis apicem versus fere obsoletis, interstitiis lævibus; utrisque limbo externo angusto, apice paullo ampliato, punctoque prope medium juxta suturam albidis.

Mas. Antennarum articulis apicalibus duobus dilatatis compressis.

Long. 4½ mm.

Hab. Ecuador (*Buckley*).

Clypeus concave and closely punctured on either side, medial line with a strongly elevated longitudinal ridge; antennæ in the ♂ (the only sex known to me) with the second joint short, obconic, the third nearly twice its length, the fourth slightly shorter than the third, the tenth and eleventh strongly thickened and dilated, compressed, the former obcuneiform, the latter subhastate, very acute; these two joints conjointly exceed one-third the length of the whole antennæ; the two lower joints nigro-piceous, the apical one yellowish white. Thorax one-half broader than long; sides straight and parallel from the base to beyond the middle, thence very slightly obliquely converging towards the apex, the anterior and posterior angles acute; above convex, sparingly punctured on the sides, hinder disk impressed on either side with a large round fovea; nigro-piceous, the basal and lateral margins pale piceous. Elytra oblong-oval, slightly dilated posteriorly, regularly rounded at the apex, convex, slightly flattened along the suture, more depressed below the basilar space, rather closely punctured and finely and irregularly wrinkled on the anterior two-thirds of the disk, the posterior third smooth and nearly impunctate. [Baly.]

155. *Diabrotica notaticollis*, Baly.

P. Z. S., 1889, p. 91.

Anguste ovata, postice ampliata, convexa, flava, nitida, pectore femoribus dorso, tibiis posticis, tarsis, antennis, basi exceptis, verticis macula, thoracis maculis quatuor arcuatim dispositis,

scutelloque nigris; thorace trifoveolato; elytris sat crebre punctatis, utrisque macula parva oblonga, infra basin prope suturam posita, fusca, plagisque tribus, prima subrotundata callum humeralum amplectente, duabusque transversis, anguste quadrato-oblongis, una prope medium, altera inter medium et apicem positis, nigris.

Long. 4½ mm.

Hab. Brazil.

Head not longer than broad, triangular; clypeus transverse, excavated on either side, medial line elevated longitudinally into a broad but ill-defined ridge; antennæ rather more than half the length of the body, slightly thickened towards the apex; the second joint short, subovate, the third nearly twice its length, the fourth scarcely longer than the third; the four lower joints piceo-fulvous, the rest black. Thorax nearly twice as broad as long; sides rounded, converging towards the base and apex, sinuate in front of the basal angle; above convex, minutely punctured; disk on either side impressed with a large round fovea; on the hinder disk, just in front of the basal margin, is a third impression, smaller and oblong; arranged in a curve on the anterior disk are four small oblong black spots; the middle fovea (in the only specimen before me) is stained with fuscous; it is probable that in some cases it is covered with a similarly coloured spot to those on the anterior disk. Elytra ovate, dilated posteriorly, regularly rounded at the apices; above convex, faintly depressed along the suture below the basilar space, distinctly punctured. [Baly.]

XIX. *New species of Heterocera from the Khasia Hills.* Part I. By Colonel Charles Swinhoe, F.L.S., F.Z.S., &c.

[Read July 1st, 1891.]

Plate XIX.

BOMBYCES.

SYNTOMIDÆ.

Hydrusa, *Walker*, ii., p. 255 (1854).

1. *Hydrusa era*, n. sp. (Pl. XIX., fig. 15).

♂. Palpi and antennæ black, tips of antennæ white above; frons, head, and body bright ochreous; space between the antennæ, a thin line behind, three longitudinal stripes on thorax, segmental bands on abdomen, and tips of abdomen, deep black. Wings hyaline, veins broadly ochreous, a blackish lunular mark in the ochreous band on disco-cellular vein of fore wings, and some black atoms on the outer ochreous veinlets of both wings; the whole space below submedian vein on fore wings and above subcostal vein on hind wings ochreous; costal and inner margins, and marginal band on both wings deep black, the inner border of the latter irregular and deepest at the apices. Under side: wings and body coloured and banded as above, slighly paler, and bands thinner on abdomen; legs black, striped with ochreous grey. Expanse of wings $1\frac{8}{10}$ in.

One specimen.

Somewhat resembles *Syntomis grotei*, Moore, in coloration and markings, and has the same peculiar ochreous tinge and black anal tip.

2. *Hydrusa baicea*, n. sp. (Pl. XIX., fig. 10).

♂ ♀. Palpi and antennæ black, antennæ white above towards the tips; frons, head, and body bright ochreous; space between the antennæ, a thin band behind, three longitudinal stripes on thorax, which meet in a band before and behind, segmental bands on abdomen, and extreme tip, deep black. Wings mostly hyaline, with black veins and borders. Fore wings with the costal line

black, the band on disco-cellular broadly black, the black colour on the lower discoidal veinlet and on the first and second median veinlets thickening towards the irregular marginal band, some ochreous colour on the veins towards the base and on the space below the submedian vein. Hind wings with the costa broadly black, and with a marginal band somewhat as on fore wings. Under side as above; legs black, streaked with ochreous grey; tarsi for the greater part whitish. Expanse of wings, $1\frac{6}{10}$ in.

Two specimens.

Allied to *H. diaphana*, Kollar; is smaller, bands on wings narrower, the black space in the first median interspace is absent, and the body is brighter coloured, with ochreous thorax instead of a black one. I found this insect also in coll. Moore without name.

3. *Hydrusa actea*, n. sp. (Pl. XIX., fig. 7).

♂ ♀. Palpi and antennæ black; antennæ in the male with short regular pectinations, serrated in the female, with white tips above in both sexes; frons, head, and body bright ochreous; space between the antennæ, a band on each side of the thorax, which meets in front, segmental bands on abdomen, and anal end, deep black; in the male the latter is broadly black, in the female only at the extreme tip. Wings mostly hyaline, veins and borders black. Fore wings with a broad band on disco-cellular, the black colour nearly filling the interspace in connection with the outer marginal black band, leaving only a small hyaline spot in the interspace just outside the disco-cellular band; otherwise both wings are marked very much as in the preceding species, except that the marginal band is broader, especially at the apex. Under side as above; legs black, marked with ochreous, and with the greater portion of tarsi whitish. Expanse of wings, ♂ $1\frac{3}{10}$, ♀ $1\frac{8}{10}$ in.

One pair.

Though superficially like the preceding, the pectinated antennæ in the male at once distinguishes it.

ZYGÆNIDÆ.

Clelia, *Walker*, ii., 465 (1854).

4. *Clelia discriminis*, n. sp.

♂ ♀. Deep black; antennæ, head, and thorax covered with metallic-blue scales; some blue scales down the centre of the abdomen of the female, but these are not visible in the male, and in respect

to these scales the species seems variable, another female having none visible. Fore wing with broad metallic-blue streaks, two at the base longitudinal, the others submarginal and central, stopping before a transverse band at one-third from base, this band slightly inclining outwards from the hinder margin; two curved subapical streaks, nearly completing a circle, a broad streak near hinder angle, and a marginal thin band, which is more complete in the male than in the female. Hind wings unmarked, except for some metallic-blue scales inside the abdominal margin in the male. Under side dull black, paler than above; hind wings with two longitudinal streaks of blue scales; fore wings with a few scales on the veins in one female only; legs and body also with blue scales in parts. Expanse of wings, $\frac{8}{10}$ to 1 in.

Two males, three females.

Differs from both *C. sapphirena*, Walker, and *C. nigroviridis*, Elwes, in the blue markings of the wings, and from the latter in the colour of the metallic scales.

CHALCOSIDÆ.

EPYRGIS, *Herr.-Schäff.*, Lep. Exot. Schm., i., pl. 2, f. 7 (1853).

5. *Epyrgis cuprea*, n. sp.

♀. Antennæ, head, and body greenish black; collar with four white spots, thorax with two on each side and one behind, abdomen with a dorsal row. Fore wings of a uniform cupreous brown, with a submarginal row of white spots, and a small basal white spot. Hind wings cupreous brown, darker than fore wings, with white streaks in the interspaces, the two nearest abdominal margin being all white; cilia of both wings white, with the exception of the upper centre of fore wings, where it is coloured like the wing. Under side: wings as above; thorax greenish black, spotted with white; abdomen white, banded with greenish black; legs brown, streaked with white; tarsi brown. Expanse of wings, $3\frac{2}{10}$ in.

Two specimens.

Differs from all the other Indian species of this genus in the uniform brown coloration of the fore wings.

MILLERIA, *Herr.-Schäff.*, Lep. Exot., i., f. 4 (1853).

6. *Milleria hamiltoni*, n. sp.

♀. Antennæ and head bright blue-green, a thin crimson collar behind the head; frons pale metallic-blue; thorax greenish brown, with some blue marks in front; abdomen with the segments

variegated, the first two pale blue, the next two brown and blue, the remainder more or less blue. Fore wings with the veins thickly marked with greenish brown, running into the interspaces, leaving a few pale sulphur-yellow basal streaks, and a number of elongated spots of the same ground colour, decreasing in size from the centre. Hind wings pale sulphur-yellow; costa, and outer border to the submedian vein blue-green, bright blue in some lights, attenuated hindwards, and running in on the veins; abdominal border limited by the subcostal vein, bright orange-yellow. Under side: wings as above, with all the markings pale bright blue; pectus pale yellow, thorax blue, abdomen with pale yellow broad bands, legs black with blue scales, femora with pale yellow stripes. Expanse of wings, 3 in.

One specimen.

A very handsome insect, allied to *M. virginalis*, Herr.-Schäff., the type of the genus, but widely separated by its dark fore wings, and metallic-blue border to hind wings. There is an example from Assam in the Oxford Museum.

GYNAUTOCERA, *Guér.*, Mag. Zool., 1830, p. 12.

7. *Gynautocera zara*, n. sp.

♂. Antennæ, head, body, and wings black; shaft of the antennæ with metallic-green scales on the basal half above; head with a few crimson irrorations, a thin crimson line behind it; thorax with a duplex crimson spot in front, and a larger one behind; abdomen with crimson tip. Fore wings with pale marks in the interspaces on the outer half, as in *G. papilionaria*, but more conspicuous. Hind wings with the apical portion and all the costal space above the subcostal vein very pale, in parts almost whitish; a pale bluish white discal space where *G. papilionaria* has the discal patch, not white with blue borders, as in that species, but of a uniform dirty bluish white, with dentations running along the veins almost to the outer margins. Under side with the fore wings without any cyaneous reflections; hind wings with the apical space broadly pale; a crimson patch at base of fore wings; thorax and abdomen crimson, with black bands; legs black. Expanse of wings, 3½ in.

One specimen.

Allied to *G. papilionaria*, Guér., but differs considerably from it in the head being black instead of crimson, in the two crimson spots on thorax above, in the absence of cyaneous reflections below, in the pale apical

and costal portions of hind wings, and in the different character and colour of the discal patch.

NYCTEMERIDÆ.

DEILEMERA, *Hübn.*, Verz. Schm., p. 178 (1816).

8. *Deilemera carissima*, n. sp. (Pl. XIX., fig. 1).

♂. Palpi black, yellow at the base of last joint; antennæ greyish brown; head and body yellow; head, collar, and thorax spotted with black; abdomen with a double row of black spots on each side. Wings white; fore wings with greyish brown, nearly mouse-coloured bands, one before the middle, broad, disjointed in the centre, where it is somewhat macular, widening above and below, expanding on the costa, and running in on the costa to the base, also widens outwards, nearly touching the apical band, also expands broadly along the hinder margin, which it does not touch, except at the hinder angle, and runs in also to the base; a large spot close to the outer margin of the band at its centre; a broad apical band enclosing a subapical white square spot, this band narrowing hindwards, and becoming macular. Hind wings with a macular marginal band of same colour, and with an excavated outer margin to the wing before the anal angle. Under side: wings as above, body and legs yellow, fore and middle legs brown above. Expanse of wings, $2\frac{2}{10}$ in.

One specimen.

Nearest to *Deilemera mülleri*, Voll.; pattern of wings somewhat similar to *D. arctata*, Walker, but the excavated outer margin of hind wing at once distinguishes it.

LITHOSIIDÆ.

BARSINE, *Walker*, ii., 546 (1854).

9. *Barsine delicia*, n. sp. (Pl. XIX, fig. 12).

♂. Antennæ, head, thorax, and fore wings yellow; thorax and fore wings streaked with vermilion. Fore wings crossed by two brown lines or thin bands, and with the cilia brown; first band from hinder margin, one-third from base, inclining outwardly, bifurcated from above its middle, one branch inclining inwards to the costa near the base, the other to the costa at the centre, where it meets the second line, which is discal, starting from the hinder margin, beyond the middle inclining towards the apex, but not reaching it, being angled outside the cell inwards to the costa, where it meets the other line. Hind wings and abdomen vermilion, unmarked, but not so dark nor so bright as the streaks on the fore

wings. Under side: body, legs, and wings of a uniform vermilion, a brown mark on fore wings where the bands meet; bands and streaks indistinctly visible through the wings; cilia of fore wings brown. Expanse of wings, 1 in.

One specimen.

LIPARIDÆ.

REDOA, *Walker*, iv., 826 (1855).

10. *Redoa nigricilia*, n. sp.

♂ ♀. Pure white, shafts of the antennæ greyish. Wings silvery white, shining; costal line of fore wings grey; tips of cilia pale black; the females with a black dot at end of cell in fore wings, the male without it; otherwise above and below without any markings. Expanse of wings, ♂ $1\frac{8}{10}$, ♀ 2 in.

One male, two females.

Near *R. cymbicornis*, Butler, which, however, has a pure white cilia.

11. *Redoa dica*, n. sp.

♀. White; uniform in coloration throughout, body unmarked, wings with a shining glossy sheen, as in *Redoa clara*, Walker. Fore wings with the cilia arched, apex acute, outer margin nearly straight, slightly oblique, hinder margin long and convex, costal line blackish brown, an indistinct grey thin band or thick line slightly curving inwards from middle of hinder margin to costa near the apex, and in certain lights some silvery transverse thin bands are visible, running from the hinder margin towards the apex; cilia tipped with brown. Hind wings unmarked; cilia tipped with a little brown in the middle. Under side white, unmarked; fore legs black on their inner sides; all the legs with black claws. Expanse of wings, $2\frac{4}{10}$ in.

One specimen.

I am tempted to describe this insect, though it is a female, on account of its beauty, and in the hopes of getting males in the collector's further consignments; it is allied to *Redoa zinaria*, Moore, from Java.

ORGYIA, *Ochs.*, Schm. von Eur. (1810).

12. *Orgyia interjecta*, n. sp. (Pl. XIX, fig. 2).

♂. Palpi, head, and pectus reddish ochreous; antennæ with the shaft brown, plumes black; body and wings blackish brown. Fore wings with a very broad, transverse, uniform white, straigh

band from the middle of the costa to the hinder margin, its outer side overlapping the angle, the band slightly diffuse on both sides, and with the veins on the inner portion of the wing pale. Hind wings with a very large black patch on the apical portion, and the costal space above is whitish; cilia white at the apex. Under side: wings as above, but paler; thorax and abdomen whitish, tip of abdomen ochreous; legs with whitish stripes. Expanse of wings, $1\frac{8}{10}$ in.

One specimen.

Allied to *O. albifascia*, Moore, but differs much in the hind wing, which in that species is of a dark uniform blackish brown.

SOMENA, *Walker*, vii., p. 1734 (1856).

13. *Somena magna*, n. sp.

♀. Palpi, antennæ, head, and fore part of thorax pale yellowish grey, as is also the apical tuft; thorax and fore wings dark grey, irrorated with blackish brown atoms; abdomen dark brown. Fore wings with a broad yellow marginal border, with an undulating inner margin containing a large black spot in the upper discoidal interspace; a faint yellowish submarginal line in the grey portion of the wing. Hind wings grey, paler than the fore wings, faintly irrorated with grey atoms; a broad marginal whitish border, diffuse inwardly. Under side: fore wings grey, with pale yellow outer marginal border; hind wings whitish; body dark brown; legs yellowish grey. Expanse of wings, $2\frac{3}{10}$ in.

One specimen.

A very large *Somena*, allied to nothing I know of; the male (as is usual in this genus) will probably be somewhat smaller, but of the same pattern and colour.

NOTODONTIDÆ.

PYDNA, *Walker*, vii., p. 1753 (1856).

14. *Pydna notata*, n. sp. (Pl. XIX., fig. 16).

♂. Antennæ, palpi, head, thorax, and fore wings yellowish fawn-colour; thorax slightly paler behind. Fore wings clouded with reddish grey atoms, especially along the costa; two brown spots in a line in the centre of the wing near the base, a brown diffuse spot at the end of the cell, a small brown patch on the hinder margin before the middle, from whence a row of brown spots extends across the wing towards the apex; outer margin with

a row of dark brown dots between the veins. Hind wings whitish, with minute brown dots on the margin between the veins; otherwise unmarked; abdomen darker than the hind wings, but paler than the thorax. Under side of a uniform greyish colour, unmarked; legs fawn-colour, Expanse of wings, $1\frac{9}{10}$ in.

One specimen.

Its white hind wings at once distinguishes it from its nearest ally, *P. testacea*, Walker; the wings are narrower, and, though the fore wings are of the same tone of colour, the markings are differently disposed.

NOCTUES.

APAMIIDÆ.

GORTYNA, *Ochs.*, Syst. Gloss. Schm. Eur., iv. (1816).

15. *Gortyna intermixta*, n. sp. (Pl. XIX., fig. 11.)

♂. Ferruginous; palpi brownish. Fore wings with a bronzy gloss; orbicular and reniform pale, large, ringed with brown, the former round, the latter like a compressed figure of 8; a brownish patch at the base, which runs down the hinder marginal third into a sort of knob; a brown patch or spot at base of cell on the inner side of the orbicular, but clear of it; two indistinct brownish transverse lines, first before the middle from the angle of the knob, nearly upright to the costa, second just beyond the middle, outwardly deeply curved, and touching the reniform; a dark brown discal line, curving deeply outwardly, and all the wing from this line to the margin dark brown, with the exception of a pale patch at the apex; a pale, sinuous, indistinct, transverse line running through the centre of the dark marginal space; marginal line brown; cilia brown, with a pale line at its base. Hind wings and abdomen greyish brown, paler than thorax and fore wings; an indistinct discal grey band on fore wings; cilia with pale basal line. Under side of a uniform pale greyish brown, shining, the discal line on both wings faintly visible; legs dark brown. Expanse of wings, $1\frac{7}{10}$ in.

One specimen.

Has a superficial resemblance to *Pyrrhia marginata* of Klein, an European moth of the family *Heliothidæ*.

BENDIDÆ.

KALMINA, gen. nov.

♂. Antennæ, palpi, and general character as in *Hamodes;* but differs as follows:—Fore wing with the median vein distorted and

bent upwards towards the subcostal, with a large tuft of long hairs on the under side, in a glandular patch just below it in the curve; the first median branch is displaced outwards, and given off with the other two median branches from the lower angle of the cell. Hind wing with the costa expanded into a large lobe, making the apex appear as if cut across, the costal vein anastomosing with the subcostal to half the length of the cell, then curved up to near the end of the lobe on the costa.

16. *Kalmina ochracea*, n. sp. (Pl. XIX., fig. 3).

♂. Dark bright ochraceous; palpi with brown sides, pale yellow beneath; body and wings sparsely irrorated with black atoms; abdomen with a black transverse thin band before the apex. Fore wings with a large blackish brown spot at end of cell, a minute dot inside of it, another subbasal; two indistinct, incomplete, nebulous, thin, transverse bands, first before the middle, second beyond the middle, the latter outwardly angled above with another similarly angled band outside it, and running into its centre from above. Hind wings with more than the abdominal half semihyaline, and consequently paler and unmarked; some indications on the rest of the wing of two median bands, a straight pale line across both wings (omitting the semihyaline portion of hind wings), from apex of fore wings to the abdominal margin of hind wings, one-third from anal angle, this line is bordered outwardly by a dark brown line, and followed by a broad brownish ochreous band, which fills up the whole marginal space in the fore wings, but is merely a broad band with an irregular outer margin on the hind wings. Under side of a similar colour, the hind wing finely clothed, but with more than two-thirds of the lower portion of the hind wing without scales, up to and on the outer side beyond the very large sexual tuft of hairs below the median vein in the centre of the wing; outer band brown, a brown suffusion near apex of fore wings, and a medial band of small spots on hind wing. Expanse of wings, $2\frac{3}{10}$ in.

One specimen.

Has a superficial likeness to *Hamodes attacicola*, Walk.

HYPENIDÆ.

Dichromia, *Guén.*, Delt. et Pyral., 18 (1854).

17. *Dichromia mollis*, n. sp.

♂ ♀. Antennæ, head, thorax, and fore wings purplish grey; palpi purplish black, irrorated with minute white scales, and with

pale yellow tips; head, thorax, and fore wings irrorated with purplish black atoms. Fore wings with an upright sinuous whitish line beyond the middle; on its inner side is a large blackish brown patch, which is limited inwards by a pale somewhat reddish space, which occupies the basal and hinder marginal portions, the inner margin of the black patch running in a curve from the costa, one-sixth from base, to the white line about one-sixth from the hinder margin; on the outer portion of the wing is a black subapical patch on the costa, and another large blackish patch, diffused downwards, and limited above by a short sinuous line running inwards from the apex; a black marginal line, with pale lunules. Hind wings ochreous, with black marginal border, deep at apex, and fining downwards to the anal angle; in some specimens it reaches it, in others it does not; marginal line and cilia black, sometimes this colour stops short of the angle. Under side: fore wings of a nearly uniform purple-brown, a subapical interior white spot, and another on costa, one-fifth from apex; hind wings as above; body and hind legs ochreous; fore and middle legs brown. Expanse of wings, $1\frac{6}{15}$ in.

Seventeen males, one female.

The male, when freshly caught, has an anal brush of long hairs turning upwards; it is also common in Sikkim, from whence I have several specimens. It was wrongly identified in the B. M. collection as *D. trigonalis*, Guén., which I also have from Solon and Mandi; it is nearest to *D. triplicalis*, Walker, which also comes from the Khasias. It differs materially, however, in the nature of the central black patch on fore wings, which in *triplicalis* is a broad black band reaching the hinder margin, and is limited on both sides by a white line from costa to hinder margin.

HYPENA, *Schr.*, Faun. Boic., p. 163 (1802).

18. *Hypena daria*, n. sp. (Pl. XIX., fig. 14).

♂. Pinkish grey, covered with brown irrorations. Fore wings with a post-medial transverse waved line, marked with black, inclining from centre of hind margin to costa, less than one-third from apex, a similar marginal line; space between these lines darker than the rest of the wing; a black apical curved streak, with a pale space above it at the apex. Hind wing brown, darkest towards the margins; marginal line dark brown; cilia on both wings pinkish grey, strongly marked with brown. Under side

paler; hind wings with a brown discoidal spot; both wings with a central transverse thin brown band, outwardly curved on the hind wings; marginal line dark brown. Expanse of wings, $1\frac{1}{2}$ in.

One specimen.

Allied to nothing I know of.

19. *Hypena laxia*, n. sp.

♂. Pinkish brown, covered with brown irrorations. Fore wings with a duplex pale line from near centre of hinder margin to costa, one-fifth from apex; this line is curved very slightly outwards; a blackish sinuous line at apex, above which is a whitish space; from this downwards is a submarginal row of small blackish marks, and a whitish suffusion between this and the margin; marginal lunules black. Hind wings blackish brown, marginal line black. Under side paler; fore wings brown, except on the margins, which are pinkish grey; hind wings whitish, with the outer and upper portions pinkish grey, irrorated with brown; a brown discoidal spot and indications of an outwardly curved central transverse brown line; an indication of a similar line on the fore wings, one-fifth from the apex on the costa. Expanse of wings, $1\frac{3}{10}$ in.

Two specimens.

Allied to the preceding, but with a double transverse line on fore wings instead of a single one, and quite differently disposed.

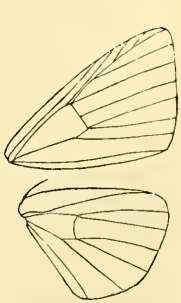
GEOMETRITES.

URAPTERYGIDÆ.

Micronissa, gen. nov.

Type. *M. margaritata*, Moore.

♂. Antennæ bipectinated to three-fourths its length; palpi short, slender, and upturned. Fore wing with the apex rather pointed, the outer margin nearly straight, the first subcostal arising before the angle of cell, the second and third given off before the apex, the fifth nearer the angle of cell, upper radial from the angle, the lower from the middle of disco-cellulars, second and third medians from lower angle, first median from before the angle. Hind wing slightly angled at second median branch, the costal



Micronissa.

vein free, the subcostals from the end of cell, radial absent, the medians from lower angle of cell, the first median from before the angle.

20. *Micronissa margaritata.*

Urapteryx margaritata, Moore, P. Z. S., 1867, p. 612; Waterhouse, Aid., xxx., pl. 184, f. 1 (1889).

Twenty-three specimens.

ENNOMIDÆ.

Hyperythra, *Guén.*, Phal, i., 99 (1857).

21. *Hyperythra phœnix*, n. sp.

♂. Of a uniform pale greenish yellow colour, finely and regularly striated with reddish brown, varying somewhat in colour from greyish greenish yellow to reddish grey, but always of a uniform coloration. Wings crossed by two pale indistinct reddish grey straight bands; first before, but close to the middle; second discal; second band limited on its inner side by a brown line, more distinct on hind wings; a largish brown subapical spot on hind wings outside the discal band, with a small spot above it, and sometimes one or two more spots on the band hindwards; marginal border of hind wing distinctly sinuous. Under side luteous, striated with grey; a broad reddish brown line or thin band across both wings from costa at one-fifth from apex to abdominal margin one-fifth from anal angle; traces of a medial thin band, a brown point at end of each cell (in some specimens this is also to be distinguished above), and a large white subcostal marginal patch on fore wings. Expanse of wings, 2 in.

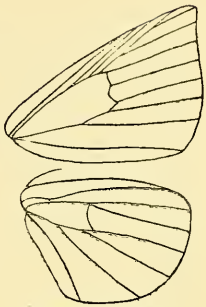
Numerous specimens; all males.

This species has come in hundreds; at first I got one, and thought it a curious and very large form of *H. lutea*, Cram., but I have now many examples. They are very uniform in character and size, have the margin of hind wings much more sinuous, the colour is never nebulous above, as in *H. lutea*, and it is undoubtedly a good and distinct form. I have also received many examples of *H. lutea* from the same locality.

ANTHYPERYTHRA, *Warren MS.*, gen. nov.

Type. *A. hermearia*, mihi.

Allied to *Hyperythra*, from which it differs in the second subcostal of the fore wing being emitted before the end of the cell instead of from the fourth, and in the cell of the hind wing being of normal length; whilst in *Hyperythra* it is much shortened, especially in the male, in which sex it is open, and contains a glandular patch on the upper side bearing a tuft of long hairs.



ANTHYPERYTHRA.

22. *Anthyperythra hermearia*, n. sp. (Pl. XIX., fig. 9).

♂. Luteous yellow, sparsely irrorated in places with purplish red; antennæ pale purplish red; palpi, head, fore part of thorax, and central margin of fore wings dark purplish red. Both wings crossed by a reddish line or thin band; in the fore wings the band is beyond the middle, in the hind wings it is in the middle; a large round purplish blotch on fore wings near the hinder margin, touching the line on the outer side; another similar but smaller blotch, a patch on the outer margin just below the apex; the entire space between the line and outer margin on fore wings is suffused with pinkish, but on fore wings there is a similar suffusion on the outer side of the line only. Under side as above, but brighter; both wings sparsely covered with small but rather prominent brown spots, and with a darker pinkish suffusion outside the line in both wings; femora yellow, with brown spots; tibiæ and tarsi pinkish. Expanse of wings, $1\frac{7}{10}$—2 in.

Five specimens.

ODONTOPERA, *Steph.*, Ill. Brit. Haust., iii. p. 162 (1828—35).

23. *Odontopera nemea*, n. sp. (Pl XIX., fig. 5).

♂. Of a uniform wood-brown colour. Fore wings with a subcostal dark brown stripe, straight and parallel with the costa from base to outer margin; two blackish marks on the costa where the two transverse dark brown lines commence; these lines do not, however, touch the costa, but run from the subcostal stripe, the

first before the middle, curving outwardly, and are only indicated on the upper portions of the hind wings; the second discal is quite straight down to the hinder angle of fore wings, and from apex of hind wings straight down to the excavation on the outer margin at the end of the median vein. Both wings are covered with brown irrorations; a black dot at end of each cell, a submarginal pale sinuous line, which on the upper part of the fore wings is included in a brown stripe, and in the hind wings runs through the discal transverse straight brown line. Hind wings with a discal sinuous pale outwardly curved line, with black points on the veins; cilia of both wings pale at its base, and dark brown outwardly in places. Under side brighter and darker brown, yellowish at the base and hinder portions of fore wings, and basal half of hind wings; bands showing through the wings, a pale patch in centre of outer margins of all the wings, and the whole surface of the wings covered with brown irrorations. Expanse of wings, $1\frac{9}{10}$ in.

One specimen.

Wings shaped as in *O. chalybeata*, Moore (a green insect), but the marginal excavations deeper.

Selenia, *Hübn.*, Verz. Schm., 292 (1816).

24. *Selenia codra*, n. sp. (Pl. XIX., fig. 8).

♂. Pale greyish fawn-colour, with a slight yellowish tinge, evenly striated with grey; plumes of the antennæ blackish. Fore wings striated with black on the costa and on the disco-cellular portions; a double blackish brown straight line from the hinder margin near the base to the centre of the wing, where it is acutely angled and retracted in a single straight line to the costa; a double curved similar line from the hinder margin one-fourth from the angle to the apex of the wing; two or three whitish dots outside the line below the apex, a large brown spot outside the line near the hinder margin, and a small brown dot below it on the margin; a black dot at the end of the cell. Hind wings with a black dot at the end of the cell, and a straight submarginal whitish line from below the apex to the anal angle, margin dentated, rather acutely so below the middle, the inner duplex line of fore wings continued subbasally across the hind wing. Under side paler, markings showing through, and a greyish nebulous pale band across the disc of both wings, terminating in a blackish mark on the abdominal margin. Expanse of wings, $1\frac{7}{10}$ in.

One specimen.

Allied to *S. decorata*, Moore, but the clear surface of

the wings and the straightness and position of the inner band at once distinguishes it from that species.

25. *Selenia murina*, n. sp. (Pl. XIX., fig. 13).

♂. Of a uniform greyish mouse-colour. Fore wings with three transverse sinuous fine brown lines; first subbasal, second just before the middle, both curving almost acutely inwards on to the costa, where there are brown patches, the second one very much the larger; third line bent a little inwards on the hinder margin, then running nearly upright rather close to the second to the costa near the apex, where there is another blackish brown mark. Hind wing with a central outwardly curved indistinct fine brown line, corresponding to the third line on the fore wings, ending in a brown mark on the abdominal margin, with another mark on the margin above it; cilia of both wings with pale tips. Fore wings with the apex bent round, and with a rather deep excavation on the outer margin just below it. Under side paler; apex of fore wings with a reddish tinge, the outer line and costal mark visible; hind wing with two brownish indistinct outwardly curved bands before and beyond the middle, and rather close to each other. Expanse of wings, $1\frac{7}{10}$ in.

One specimen.

Allied to nothing I know of.

OXYDIDÆ.

MARCALA, *Walker*, XXVI., 1764 (1862).

26. *Marcala varians*, n. sp.

♂. Wings shorter than usual, and comparatively broader; general coloration reddish grey, very variable, sometimes yellowish, in one specimen nearly bright red, and in another bright green. Fore wings with an interior nearly erect transverse brown thin band about one-fifth from base, which curves in to a spot or slight thickening on the costa; a similarly coloured discal band from the apex to the hinder margin, one-fourth from hinder angle; this band in some specimens has a small spot near the apex, and is accompanied by a large brown spot on its outer side near the hinder angle, but this is not present in all specimens; a mark like the commencement of another band on the costa one-third from apex, and a small brown dot at end of cell; the entire wing minutely irrorated with grey atoms, and in places sparsely striated with blackish brown. Hind wings striated with blackish brown; a

brown dot at end of cell, a brown outwardly curved thin discal band, the colour of the wing inside the band whitish, outside of it generally of the same colour as the fore wings, but paler. Under side in all specimens, whatever the coloration above may be the general coloration of both wings, is of a uniform pale yellowish, thickly striated in parts with brown, and with the cell-dots and transverse bands as above. Expanse of wings, $1\frac{5}{10}$ in.

Twenty specimens; all males.

In its markings it differs from all the other species of this genus in the disposition of the bands, which usually, in this genus, run parallel with each other.

ÆNOCHROMIDÆ.

Sarcinodes, *Guén.*, Phal., i., p. 188 (1857).

27. *Sarcinodes susana*, n. sp.

♂. Reddish ochreous, abdomen marked with purplish brown; wings spotted with purplish brown, and with patches of the same colour; a transverse band of these patches before the middle; a straight discal line, not so dark as the patches, from apex of fore wings to abdominal margin of hind wings, one-third from anal angle, the line edged with whitish on both sides, and between this line and the margin there is another irregular band of patches; brown marginal points, and cilia reddish. Under side as above, but paler and more yellow. Expanse of wings, $2\frac{4}{10}$ in.

One specimen.

Nearest to *S. debitaria*, Walker, but without the cell-spot and subbasal band on fore wings; the discal line, though similarly placed, is of a different description, and differs altogether in the purple-brown patches with which the wings are covered. On the under side *S. debitaria* is greyish, thickly striated with brown, with a discal line of brown points across both wings.

BOARMIIDÆ.

Cleora, *Curt.*, Brit. Ent., p. 88 (1825).

28. *Cleora nebulosa*, n. sp.

♂. Palpi brown, with pale pinkish tips; shafts of the antennæ pale pinkish grey, with brown bands and brown plumes; body and wings with the ground colour pale pinkish grey, clouded with brown; abdomen with pale pinkish grey apex. Fore wings with some blackish brown marks on the costa, which are the apparent

indications of two nebulous brown bands, one before the middle, and the other discal, which bifurcates on to the costa and apex, leaving a pale space between; a submarginal dentated pale line, a blackish marginal line interlaced with black lunular spots; pinkish cilia varied with brown patches, and the entire wing more or less striated with brown, giving the whole surface a nebulous appearance difficult to describe. Hind wings with the upper part clear of striations, the lower striated like the fore wings; a brown lunular mark at end of cell, a submarginal whitish sinuous line, banded on the inside with brown, like in the fore wings; cilia pale, interlined, marginal line blackish brown and sinuous. Under side ochreous, striated in parts with brown; a brown spot at end of each cell, and a broad discal brown band across both wings, touching the margin in most parts. Expanse of wings, $1\frac{4}{10}$ in.

Six specimens.

A very curiously marked *Cleora*.

Opthalmodes, *Guén.*, Phal., i. 447 (1857).

29. *Opthalmodes pulsaria*, n. sp.

♂. Antennæ brown, thorax and wings of a uniform dark green colour, abdomen grey. Both wings with pale lunular discoidal marks bordered with brown, and crossed by three outwardly dentated reddish brown bands, outwardly edged with whitish; brown marginal spots somewhat lunular in shape in the interspaces; cilia green, marked with whitish opposite the veins. Under side pale grey; a large blackish spot at the end of each cell, and both wings crossed by a broad submarginal blackish band, which on the fore wings runs on to the margin, except at the apex; body and legs grey. Expanse of wings, $2\frac{2}{10}$—$2\frac{5}{10}$ in.

Three specimens.

Allied to *O. infusaria*, Walker, is smaller, of a different green colour, has reddish bands instead of grey, and of a different character.

30. *Opthalmodes lectularia*, n. sp. (Pl. XIX., fig. 4).

♂. Antennæ brown, thorax and wings greyish, suffused with green, and irrorated with brown atoms; abdomen grey. Wings with brown spots at the end of each cell, centred with white, and crossed by three outwardly dentated transverse brown bands, outwardly edged with whitish, outer margin with brown spots in the interspaces; cilia in whitish and brown patches, the latter being

opposite the brown spots on the margin. Under side grey, densely irrorated with brown, and with broad submarginal suffused brownish bands, which on the fore wing run into the margin; body grey, legs grey; tarsi brown, with greyish white bands. Expanse of wings. $1\frac{8}{10}$ in.

One specimen.

Allied to *O. diurnaria*, Guén., very much smaller, the bands straighter on the fore wings, and of a different shade of green.

DINDICA, *Moore*, Descr. Ind. Lep. Atk., iii., p. 248 (1888).

31. *Dindica para*, n. sp.

♂. Antennæ brown; palpi, head, thorax, and fore wings greyish green, varying much in colour in different specimens to grey and greyish ochreous. Fore wings covered with fuscous irrorations; an outer blackish line from hinder margin, one-fifth from the angle, ascending in a sinuous form for one-third, then curving towards the outer margin, where it forms a dentation near the margin above the middle, and is retracted in a nearly straight line to the costa one-fourth from apex; a short dentated subapical white line from the costa to the apex of the tooth of the discal line, where there is an indistinct reddish spot on a pale ground; outer marginal line black and lunular; cilia ochreous grey, interlined, and with brown patches; there are also some internal brown streaks on the veins. Hind wing ochreous, dark and bright in some specimens, nearly white in others, always pale on the costal space; a nebulous marginal band of the same colour as the fore wings, patched with blackish on its inner side, being in reality a black submarginal incomplete band on the under side showing through the wing. Under side greyish white, suffused with ochreous on the inner portion of the hind wings; a large blackish spot at the end of cell of fore wings, some black marks on costa, similar subapical striations, limited by a diffuse discal band reaching neither costa nor hinder angle; black lunules on the margin, and some black marks on the white cilia. Hind wings with an incomplete submarginal band, which varies in size and distinctness in many examples; body and legs ochreous grey; legs with brown bands. Expanse of wings, $1\frac{6}{10}$—$1\frac{7}{10}$ in.

Many specimens; all males.

Like a miniature *D. polyphœnaria*, Guén., which has come from the same locality, in the same lot in rather large numbers; the marks on the fore wings are very

similar, but the colour of the wing is of a different character, and the marginal band of the hind wings above and below is quite different, and about half the width of that species.

PINGASA, *Moore*, Lep. Ceylon, iii., p. 419 (1887).

32. *Pingasa alba*, n. sp. (Pl. XIX., fig. 6).

♂. White; antennæ with the pectinations brown. Fore wings with fine brown marks on the costa, a faint grey transverse outwardly curved line at the basal third. Both wings with a discal grey line nearly corresponding to the shape of the outer margins, with small dentations outwards on the veins; there is a very slight ochreous grey tinge on the fore part of the thorax and base of wings; otherwise above and below the coloration is uniformly white; marginal line above grey, Under side without markings, with the exception of the discal line being slightly visible through the wings, and a slight brown suffusion on fore wings outside the line; legs with pale brown stripes. Expanse of wings, 2 in.

One specimen.

The discal line runs up to the costa in an even curve, somewhat as in *P. rufofasciata*, Moore, but is nearer to the outer margin; its white unmarked surface, however, distinguishes it from all the other Indian species of this genus.

ALANA, *Walker*, xxxv., p. 1568 (1866).

33. *Alana albopunctata*, n. sp.

♂. Of a uniform dark reddish brown; shafts of the antennæ pale, plumes blackish; tip of abdomen ochreous. Both wings much striated with brown, and with white striations, the latter dense on basal half, especially on fore wings. Fore wings with a large white patch at apex. Hind wings with a largish white spot inside the end of the cell; both wings with two rows of white discal points on a darker band of brown striations, these points in some specimens suffused into white striations; margin of both wings pale, and studded with clear white points on the veins; cilia palely interlined. Under side grey, suffused with reddish ochreous, brighter on hind wings, and with the outer portion of the wings irrorated with brown atoms; body and legs ochreous red. Expanse of wings, $1\frac{4}{10}$ in.

Many specimens (over two hundred); all males.

Allied to *A. vexillaria*, Guén., and *A. riobearia*, Walk.;

between the two in size, somewhat like the former in colour and pattern above, and like the latter on the under side; very constant in colour and pattern in all the numerous specimens received.

MACARIDÆ.

MACARIA, *Curt.*, Brit. Ent., p. 132 (1826).

34. *Macaria temeraria*, n. sp.

♂. Pale grey, tinged with ochreous, and striated with darker grey and brown; abdomen with two rows of brown dots. Fore wings with four transverse lines; first subbasal, sinuous, greyish brown, and well curved outwardly; second medial, third discal; both similarly coloured, running outwardly from costa, then sharply bent inwards to the hinder margin; second in an irregular and distorted shape, the lower portion in some specimens not visible; third whitish from the angle downwards, and nearly straight; fourth whitish from hinder margin upwards to costa near apex, the striations from third line to costa dark brown, giving a suffused brown shading to this part of the wing. Hind wings with a fine brown dot at end of cell; an interior and a discal outwardly curved sinuous greyish brown line, and a straight white line from hinder angle to apex, with a brown inner edging, the margin outside this line suffused with brownish; cilia of both wings interlined, and in five shades: white, grey, ochreous, grey, and ochreous. Under side paler and brighter, with lower and outer portions of both wings whitish; both wings with interior and exterior outwardly curved sinuous lines, and with outer lines as above; a fine brown dot at end of cell in hind wings, brown marginal dots between the veins, and interlined cilia. Expanse of wings, 1½ in.

Four specimens.

CARIGE, *Walker*, xxvi., p. 1631 (1862).

35. *Carige rachiaria*, n. sp.

♂. Chocolate-brown, irrorated with black; shaft of antennæ speckled with black, pectinations variegated, being black with pale chocolate coloured spots; abdomen with pale bands; wings with pale veins. Wings with a black dot at end of each cell; a discal macular band of black square spots, with a continuous pale line running through them; these patches are divided by the pale veins; three patches on the fore wing, subcostal, above the middle and on the hinder margin, and two at lower end of hind wing; the

pale line is bordered with black, and is obsolete on upper portion of hind wing; also a submarginal row of small black spear-shaped marks, outwardly pale-edged, these being also obsolete on upper portion of hind wings; a pale ante-ciliarly line and brown cilia, with pale tips and pale patches opposite the extremities of the veins. Under side pale chocolate-grey, densely irrorated in parts with brown; a brown point at end of each cell, indications of central and submarginal bands, cilia as above. Expanse of wings, $1\frac{2}{10}$ in.

Twelve specimens.

LARENTIIDÆ.

CIDARIA, *Treit.*, Schm., vi., 2, 242 (1828).

36. *Cidaria fecunda*, n. sp.

♂. Greenish brown, top of head pinkish grey, abdomen suffused with this colour on its lower portions. Fore wings with the ground colour pinkish grey, irrorated and suffused in parts with greenish grey, making the coloration variable in many specimens; the wing crossed by four brown bands, subbasal, ante-medial, post-medial, and submarginal; these bands are margined by blackish sinuous lines, which are dentated in places; all curve outwardly, the third band deeply above its centre; marginal line black; cilia pinkish grey, with a pale brown band, and with brown patches opposite the veins. Hind wings pale grey, more or less suffused with pinkish, with a submarginal grey band composed of two inwardly dentated lines, and with some faint sinuous lines in the interior portions of the wing, which in some specimens are not visible, except on the abdominal margin; marginal line black, cilia as in fore wings. Under side of a uniform pale pinkish grey, with some distinct sinuous brown lines forming broad discal and marginal bands; legs with brown above; tarsi with pinkish grey bands on the brown portions. Expanse of wings, $1\frac{2}{10}$ in.

In great numbers; all males.

A very distinct species, difficult to describe, and must be very plentiful in the Khasia Hills, many hundreds having come in one batch.

37. *Cidaria scortea*, n. sp.

♂. Greenish grey; palpi covered with black hairs; body and fore wings irrorated with brown, densely packed on the fore wings into three or four broad transverse bands, the central the most

distinct, being limited outwardly by an inwardly dentated pale pinkish grey sinuous line, with black tips to the dentations; this is the commencement of a discal band of pale pinkish grey, the rest of the margin being brown; the pinkish band has a brown sinuous line running through it, and the marginal brown portion has two pale sinuous and dentated lines, these lines being margined with dark brown, and with black tips to the dentations; marginal line brown and lunular; cilia pale pinkish grey, with brown patches opposite the veins; costa with brown markings. Hind wings greyish fawn-colour, marginal line and cilia as in fore wings. Under side pale dirty grey, an indistinct greyish sinuous discal line, and marginal darker band. Expanse of wings, $1\frac{3}{10}$—$1\frac{1}{2}$ in.

Many specimens; all males.

38. *Cidaria furva*, n. sp.

♂. Dark olive-brown. Fore wings crossed by many pale transverse lines from the base to the outer third of the wing; these lines are crossed by the pale pinkish veins; across the centre of the wing is a darker brown band of nine squarish large spots, the apical portion of the outer third is pale grey, the space below having dark spaces, and through it all runs a discal duplex brown line, dentated inwardly on its upper portions; there is also a submarginal blackish line, terminating by running into the outer margin below the apex. Hind wing greyish brown, with a pale pinkish grey costal space, and a pale sinuous short line or band running inwards from the anal angle, very indistinct in some specimens. Both wings with marginal line black; cilia pale pinkish grey, with a brown internal band, and brown patches opposite the veins. Under side pale ochreous grey, irrorated with brownish grey, with some indications of the markings on the upper sides. Expanse of wings, $1\frac{6}{10}$ in.

In great numbers; all males.

Allied to *C. obscurata*, Moore, and looks very like it on the under side when the wings are closed; but the markings above are different, and the large apical pale patch at once distinguishes it.

Explanation of Plate XIX.

Fig. 1. *Deilemera carissima*, ♂, n. sp., p. 477.
2. *Orgyia interjecta*, ♂, n. sp., p. 478,
3. *Kalmina ochracea*, ♂, n. sp., p. 481.
4. *Opthalmodes lectularia*, ♂, n. sp., p. 489.
5. *Odontopera nemea*, ♂, n. sp., p. 485.
6. *Pingasa alba*, ♂, n. sp., p. 490.
7. *Hydrusa actea*, ♂, n. sp., p. 474.
8. *Selenia codra*, ♂, n. sp., p. 486.
9. *Anthyperythra hermearia*, ♂, n. sp., p. 485.
10. *Hydrusa baicea*, ♂, n. sp., p. 473.
11. *Gortyna intermixta*, ♂, n. sp., p. 480.
12. *Barsine delicea*, ♂, n. sp., p. 477.
13. *Selenia murina*, ♂, n. sp., p. 486.
14. *Hypena daria*, ♂, n. sp., p. 482.
15. *Hydrusa era*, ♂, n. sp., p. 473.
16. *Pydna notata*, ♂, n. sp., p. 479.

XX. *On some cases of Dimorphism and Polymorphism among Palæarctic Lepidoptera.* By Sergé Alphéraky, of St. Petersburg. Communicated by Henry John Elwes, F.L.S., F.Z.S., &c.

[Read August 5th, 1891.]

Many authentic instances of dimorphism, or even polymorphism, in the female sex of various species of Lepidoptera are known to exist, but only a few such cases are generally acknowledged for the male sex. It is rather strange that, when in certain species the males are of one form [monomorphic], but the females dimorphic (whether the different forms are found together or in different localities widely apart), nobody seems to wonder at the fact; whereas, if females of supposed distinct species are absolutely identical in appearance, but their males dimorphic, such males are mostly treated as belonging to separate species.

Let us take, as an example, *Cleogene Niveata*, Sc. (= *Illibaria*, Hb.), from the Carniola and Styrian Alps, where both males and females are white, and the Pyrenean *Cleogene Peletieraria*, Dup., which differs, from the first, only in the male being of a dark slate-colour, and a trifle larger, as a rule.

The females of *Niveata* and *Peletieraria* are identical. We shall find but a small number of lepidopterists inclined to recognise in these two forms mere varieties of one and the same moth, which they most decidedly are.

It would have been still more difficult to have their specific identity admitted if both forms inhabited the same locality, as in some other cases, where dimorphic forms really do fly together.

Of generally acknowledged instances of dimorphism in the male sex there are but few, and these are of such an unmistakable and obvious character that no place for the slightest doubt is left, even for the most obstinate species separator. Among such cases it is enough to

mention *Colias Erate*, Esp., and its orange form, *Chrysodona*, B.; *Thais Medesicaste*, Ill., and its form, *Honoratii*, B. (so scarce, but so constant, too); *Chrysophanes Phlæas*, L., with the dark form, *Eleus*, F., and the whitish ab. *Schmidtii*, Gerh. In these cases the dimorphic forms fly, in some localities, side by side, and are valuable as a proof that dimorphism in males does really exist.

Such forms as *Chrysophanes* ab. *Schmidtii* and *Thais ab. Honoratii* are generally considered as mere accidental varieties—*aberrations* of the typical forms; but, though scarce by themselves, being very constant in their distinctive characters, both ab. *Schmidtii* and ab. *Honoratii* must be regarded as true dimorphic forms, the more so, as in some analogous cases rare *aberrations* in one locality may become the constant form in others. I will now try to illustrate this by the following facts.

In the summer of 1867, when I was living near the Sea of Azov, at Taganrog, a friend of mine, Mr. William Daish, an Englishman, bred from numerous caterpillars of *Papilio Machaon*, L., an unusual and remarkably fine female imago, with an abnormal development of yellow scales on the wings and on the abdomen (the latter being entirely yellow) such as I had never seen in any other individual amidst numerous European specimens. This female was, consequently, a very remarkable aberration for the locality where it had been bred. Many years later, exactly similar specimens were found in Turkistan, near Samarkand and Marghelan; and the form has been described as var. *centralis* by Dr. Staudinger, who sees it in the second brood of the butterfly of those localities, whereas he says that the specimens of the first brood there do not differ from the ordinary European form.

I myself have long been of Dr. Staudinger's opinion as to two forms of the same species never flying side by side. This theory of my much esteemed and celebrated friend is, after all, as I now think, only so far correct, that it is not generally the case that constant varieties do fly together with their typical forms, and also as long as the variety is not a strictly dimorphic form of the type.* I have now come to the conviction that dimorphic

* I do not consider slight variations of colouring, size, form, and pattern of the wings as cases of dimorphism.

forms of a species which fly together, and which are, accordingly, considered as distinct species, do sometimes become constant and monomorphic representatives of the species in some other locality.

Lederer is one of the first who speaks of such a case in the 'Horæ Soc. Ent. Ross.,' vol. vi., pp. 79, 80. This sagacious entomologist says there, that he considers both *Lycæna Eurypilus*, Frr., and *L. Zephyrus*, Friv., as varieties of *L. Argus*, L. Although I cannot agree with Lederer in this last point, I am well convinced that he is right as regards the specific identity of *Zephyrus* and *Eurypilus*, these two *Lycænæ* being dimorphic forms of one species.

I had forgotten what Lederer had written on the subject till quite recently, when, having had to separate females of *Eurypilus* and *Zephyrus* from different localities that were intermingled, I was in some cases greatly puzzled, and could not with certainty decide to which of the two species the females belonged.

In looking over the works of those authors who were most likely to speak of these *Lycænæ*, I was glad to find in the above-mentioned paper Lederer's opinion in accordance with the conclusion I had arrived at myself, *i. e.*, that *Zephyrus* and *Eurypilus* are forms of one species, the only really characteristic distinction being in the blue and brown colouring of the respective males, whilst the females are alike—monomorphic.

This case is very instructive in many respects. In some countries, as, for example, in the North-east of Asia Minor (Pontus), and in Armenia, both forms—*Zephyrus* and *Eurypilus*—fly together; whereas they fly separately, as monomorphic forms, in other localities. So *Eurypilus* flies alone in some parts of Persia and in the North-western part of Asia Minor, whilst the blue-male form *Zephyrus* has not been found in some parts of Persia* and in the North-western part of Asia Minor, in the so-called Bithynia.

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* I have seen a good number of *Eurypilus*, but no *Zephyrus* from Persia; and Mr. Herz, who has collected a great number of *Lycænæ* in Persia, has not met *Zephyrus* there, but only *Eurypilus*. Lederer says, *l. c.*, that he has only received *Eurypilus* from Astrabad, and Dr. Staudinger alone speaks of Persian *Zephyrus* in the 'Horæ Soc. Ent. Ross.,' vol. xiv., p. 235. *Zephyrus* must therefore be very local in Persia.

In Greece, in European Turkey, in Switzerland (here as a local variety, named *L. Lycidas*, Trapp.), and in Spain (here as var. *Hesperica*, Rbr.), *Zephyrus* only flies. In the country east of the Caspian Sea, and in Turkistan, we find this same *Zephyrus* with blue males, but slightly modified—var. *Zephyrinus*, Stgr. In all these last-named countries the form with the blue male appears to fly alone, and its range is perhaps greater still, as it is very probable that *L. Pylaon*, F. v. W., and *Cyane*, Ev., are also but varieties of *Zephyrus*. In this case, we find that the form with the dark brown male has a much smaller geographical distribution than the one with the blue male. But we shall soon see that in another similar case it is the reverse, the brown form being more widely distributed than the blue one.

I must here remark that Lederer speaks of intermediate forms between *Zephyrus* and *Argus* as found near Amasia, but Dr. Staudinger has not found such specimens in Lederer's collection. Mr. Cristoph also thinks* that some specimens of *Argus* in the Caucasus show a transition to *Zephyrus*, but, after a careful examination of such specimens, I think that they all belong to *Zephyrus*, this species being just as inclined to individual variation as *Argus*.

Does not this case of dimorphism indicate that other geographical varieties may have originated in the same way? Beginning by getting dimorphic in a certain locality, does not the species then spread in various directions under the one or the other form, according to which of the two is best fitted for the new locality, and for the probably modified conditions of existence?

Against Lederer's opinion as to *Eurypilus* and *Zephyrus* being varieties of *Argus*, and of *Zephyrus* and *Eurypilus* being dimorphic forms of one species, we have Dr. Staudinger's criticism in vol. xiv. of the 'Horæ Soc. Ent. Ross.,' p. 235, *et seq.*

Although I am quite of the Doctor's opinion concerning the specific distinctness of *Argus* and *Zephyrus-Eurypilus*, I find his endeavour to prove the distinctness of the two last-named forms insufficiently conclusive. One of his strongest arguments against the specific identity of these

* 'Mémoires sur les Lépidopt.,' N. M. Romanoff, vol. i., p. 51.

forms is that they fly in some localities side by side, which, as we know, he does not admit for forms of the same species. Then, after giving some details of lesser importance, by which *Eurypilus* is to be distinguished from *Zephyrus*, such as a darker brown under side of the wings of the first, as compared with the greyish under side of the wings of the second, &c., Dr. Staudinger acknowledges "that some of the females of *Eurypilus* and *Zephyrus* are not to be separated with certainty," and this statement of his is absolutely fatal to the cause he defends.

I think that I know of several other analogous cases in the same genus, but I do not think it prudent to speak of these before having studied them more thoroughly, as it is very easy to fall into grave errors in questions of so delicate a nature; and I will now pass to the following instance, which I have closely analysed, and in the truth of which I have no reason to doubt.

Those of my readers who may find interest in cases of dimorphism presented by some of our Palæarctic Rhopalocera are surely well enough acquainted with the *Lycænæ*,—*Admetus*, Esp., *Ripartii*, Frr., *Dolus*, Hb., and *Menalcas*, Frr.,—so that it is useless my recapitulating here the well-known differences which characterise these four forms. It is sufficient to remark that nearly all lepidopterists consider *L. Ripartii* as a mere variety of *L. Admetus*, and that *L. Menalcas* is considered as the Asia Minor form of *L. Dolus* of France and Piedmont. A good description of *L. Dolus*, Hb., under the name *Lefebvrei*, is given by Godart in his 'Encyclopédia Méthodique,' p. 695 (1819), but, as far as I know, Boisduval is the first who points out the affinities of *Dolus*, *Admetus*, and *Ripartii*. In his 'Icones Historiques,' p. 71, he says, speaking of *Dolus*:—"Cette espèce forme avec *Admetus* et *Rippartii*, un petit groupe fort remarquable par le duvet cotonneux, qui couvre une partie des ailes supérieures des mâles. On ne rencontre cette particularité dans aucune autre espèce connue." Freyer, in describing the *L. Menalcas*, is right when he believes it to be a variety of *Dolus*, Hb.

Dr. Staudinger, who, in the 'Horæ Soc. Ent. Ross.,' vol. xiv., p. 248, speaks of *Menalcas* and *Ripartii*, says that he fails to distinguish the females of these two

Lycænæ, but, in the same paper, speaking of *Admetus* and *Ripartii*, he expresses a certain doubt as to these last two belonging to one species.

Now we know that, in reality, the last two forms differ only in *Ripartii* having a distinct white streak on the under side of the hind posterior wings, which is deficient in *Admetus*.

Dr. Staudinger next speaks of intermediate forms, found in Asia Minor, with the streak partly present. Such intermediate forms he is inclined to consider as hybrids of *Admetus* and *Ripartii*. But this same streak is so variable in the intricate *Lycæna Damon*, Schiff., group, that it has entirely lost, in my opinion, any importance as a specific character.

Having lately had the opportunity of closely examining specimens of *Admetus*, *Ripartii*, *Dolus*, and *Menalcas*, having done it with the greatest care and with the aid of good magnifying glasses, having weighed all the pros and the cons of the question, I now firmly believe that all four forms belong to one species. We consequently have, in France, *Dolus* and *Ripartii* as dimorphic forms of a species which, in Asia Minor, occurs in three forms —*Admetus*, *Ripartii*, and *Menalcas*. The whitish-blue forms, *Dolus* and *Menalcas*, are found nowhere independently from *Ripartii*; whilst the latter and *Admetus* do occur in certain countries as constant and perfectly monomorphic forms.

I firmly believe that when the majority of similar instances of dimorphism or polymorphism have been recorded, it will be found that the number of such cases in the male sex of Palæarctic Lepidoptera is by no means inferior to the number of cases presented by the female sex.

XXI. *Effect of change of climate upon the emergence of certain species of Lepidoptera.* By Gervase F. Mathew, Fleet Paymaster, Royal Navy, F.L.S., F.Z.S., &c.

[Read October 7th, 1891.]

On the 1st January, 1891, H.M.S. 'Tyne' left Portsmouth for Hong Kong, arriving at Portsmouth again, on her return voyage, on the 2nd May. At the time of our departure I had a number of pupæ of several kinds of Lepidoptera, which were obtained, when larvæ, at Chatham and Sheerness in September, and a few pupæ, dug at Staplefield, Sussex, in August, 1890.

As the result of the effect of change of climate on these pupæ has been somewhat curious, perhaps the subjoined table of dates of emergence and temperatures will be of some interest.

Everyone will remember that last winter was an excessively severe one. The cold weather began on the 26th November, and continued throughout December. At Portsmouth on the 1st January, and at Plymouth on the 2nd January, it was somewhat milder, and there were indications of a break up of the frost; but the change was not sustained, for a couple of days after we left Plymouth the cold weather set in again with renewed vigour, and lasted well on into February. On our passage to, and through the Mediterranean, the temperature was comparatively low, and the snow upon the mountain ranges of Spain and Northern Africa was lower down the slopes than has been noticed for some years. At Malta the nights were quite cold, and we did not get into really warm weather until we had passed through the Suez Canal into the Red Sea.

Date, 1891.	Position of Ship.	Average daily temperature.	Mamestra brassicæ.	Tæniocampa stabilis.	Tæniocampa crudâ.	Hadena chenopodii.	Hadena oleracea.	Eupitheeia centaureata.	Eupitheeia subnotata.	Eupitheeia absinthiata.	Peluzga comitata.
1 Jan.	Portsmouth.	41°									
2 ,,	Plymouth.	43°									
3 ,,		52°									
4 ,,	Plymouth to	53°									
5 ,,	Gibraltar.	56°									
6 ,,		55°									
7 ,,		49°									
8 ,,	Gibraltar to	45°									
9 ,,	Malta.	45°									
10 ,,		49°									
11 ,,	Malta.	51°									
12 ,,		51°									
13 ,,		56°									
14 ,,	Malta to	57°									
15 ,,	Port Said.	59°									
16 ,,		61°									
17 ,,	Suez Canal.	62°									
18 ,,		59°									
19 ,,		69°									
20 ,,		78°									
21 ,,	Suez to Aden.	71°									
22 ,,		77°								1	
23 ,,		74°									
24 ,,	Aden.	79°									
25 ,,		79°									
26 ,,		80°									
27 ,,		77°				1					
28 ,,		76°									
29 ,,	Aden to	77°									
30 ,,	Colombo.	78°								1	
31 ,,		80°									
1 Feb.		80°									
2 ,,		80°				2					
3 ,,		79°				2					
4 ,,	Colombo.	79°				2					
5 ,,		79°				2					
6 ,,		81°				1				1	
7 ,,		80°		1		3	1				
8 ,,		81°				6				1	
9 ,,	Colombo to	80°				3					
10 ,,	Singapore.	82°									
11 ,,		82°				2					
12 ,,		82°				3					
13 ,,		81°				1	1				
14 ,,	Singapore.	78°			1	1	1			1	
15 ,,		77°				1	1				
16 ,,		79°				1	2			1	
17 ,,	Singapore to	79°					2				
18 ,,	Hong Kong.	80°				1	1				
19 ,,		81°				3	2				
20 ,,		76°				1	1				
21 ,,		70°				3	3			1	
22 ,,		65°				1					
23 ,,		69°					1			2	
24 ,,		70°				1	1			1	
25 ,,		65°				2	4				
26 ,,	Hong Kong.	68°									
27 ,,		67°									
28 ,,		69°				2	4				
1 Mar.		67°				2	2			2	
2 ,,		65°				2	1			1	
3 ,,		65°				2	2			2	
				1	1	51	30			15	

Date, 1891.	Position of Ship.	Average daily temperature.	Mamestra brassicæ.	Tæniocampa stabilis.	Tæniocampa erudа.	Hadena chenopodii.	Hadena oleracea.	Eupitheeia centaureata.	Eupitheeia subnotata.	Eupitheeia absinthiata.	Pelurga comitata.
	Brought over..			1	1	51	30			15	
4 Mar.		66°				3	1			1	
5 ,,	Hong Kong.	67°				4	2			3	
6 ,,		66°				3	3			2	
7 ,,		66°				5	1			1	
8 ,,		73°				2				3	
9 ,,		80°					2	1		1	
10 ,,	Hong Kong to Singapore.	82°				2	2			5	
11 ,,		79°				2				4	
12 ,,		82°				2				1	
13 ,,		83°					3			3	
14 ,,	Singapore.	81°					2		1	3	
15 ,,		82°					1		1	4	
16 ,,		82°				1	2		2	3	
17 ,,	Singapore to	83°	2			1				3	
18 ,,	Trincomalee.	83°							1	5	
19 ,,		82°				1			5	7	
20 ,,		82°							5	3	
21 ,,		82°				1			5	2	
22 ,,	Trincomalee.	83°							6	3	
23 ,,		84°							3	3	
24 ,,		83°							7	2	
25 ,,	Colombo.	85°							6	1	
26 ,,		83°							5	3	
27 ,,		83°							8	2	
28 ,,		84°							9	1	
29 ,,		82°							7	3	
30 ,,	Colombo to	82°							5	2	
31 ,,	Aden.	79°							7	1	
1 April		81°							3		
2 ,,		82°							8		
3 ,,		82°				1			6		
4 ,,	Aden.	82°							3		
5 ,,		83°				1			3		
6 ,,		85°				1			5		
7 ,,		78°							3		
8 ,,	Aden to Suez.	75°							3		
9 ,,		73°							3		
10 ,,		74°							3		
11 ,,	Suez Canal.	95°							4	1	
12 ,,	Port Said.	78°									
13 ,,		64°							3		
14 ,,	Port Said	63°							1		
15 ,,	to Malta.	59°									
16 ,,		59°									
17 ,,		60°									
18 ,,	Malta.	60°									
19 ,,		66°									
20 ,,		60°									
21 ,,		60°							1		
22 ,,	Malta to	60°							1		
23 ,,	Gibraltar.	60°							1	2	
24 ,,		62°									
25 ,,	Gibraltar.	64°							1		
26 ,,		62°								1	
27 ,,		59°									
28 ,,	Gibraltar to	56°									
29 ,,	Plymouth.	54°									
30 ,,		50°									
1 May	Plymouth.	53°									
2 ,,	Portsmouth.	54°									
		Totals	2	1	1	81	49	1	135	94	

From the foregoing table it will be seen that (1), *Eupithecia absinthiata* was the first to make its appearance, the first specimen emerging on the 22nd January, our fourth day in the Red Sea, and twenty-first from England, the average temperature on that day being 77°. This species was peculiarly affected, the greater number of them emerging in the hottest weather, between the 10th and 30th March, after which they continued to appear at intervals up to the 26th April, by which time the ship had reached Gibraltar on her way home. But, strange to say, between the 7th and 13th May, while we were at Chatham, fourteen more appeared. The weather was then bright and warm.

(2). *Hadena chenopodii* appeared on the 27th January, and from that day until the 21st March they continued to emerge nearly every day, the greater number, however, appearing between the 2nd February and the 11th March, the increasing temperature seeming to affect them more rapidly than any of the other species, although one remained over, and did not hatch until the 7th May, at Chatham.

(3). *Tæniocampa stabilis.* Strange to say this species, which one would naturally expect to be the first to feel the effects of an increased temperature, did not put in an appearance until the 7th February, the day after the ship left Colombo, when the average temperature was 80°, and after the ship had been nearly three weeks in tropical weather.

(4). *Hadena oleracea* was not so quickly affected as *chenopodii*, the first emerging on the 7th February, and the second on the 13th, from which time they came out daily until the 16th March, after which date no more appeared.

(5). *Tæniocampa cruda* was still more remarkable than *stabilis*, as the only specimen bred did not appear until the 14th February.

(6). *Eupithecia centaureata.* A single example only appeared on 9th March.

(7). *Eupithecia subnotata* was not affected by the increase of temperature until the 13th March, the day before we arrived at Singapore on our way home, when the first specimen appeared. From this date they emerged almost daily until we reached Gibraltar on the 25th April, and one remained over and came out at Chatham on the 21st May.

(8). *Mamestra brassicæ.* I had not more than half-a-dozen pupæ of this species, and only two of them emerged, and the same day, the 17th March, on our homeward voyage between Singapore and Trincomalee. This is a moth I should have thought would have been earlier affected.

(9). *Pelurga comitata.* I obtained about four dozen larvæ of this species feeding upon *Chenopodium* at Chatham in September, 1890, but not a single moth appeared during the cruise, and I imagined that the pupæ had all perished. However, on the 11th August, at Sheerness, a fine female emerged. The larvæ were fed up in a large wide-mouthed bottle, and on the 6th September, as I required the bottle for other larvæ, I shook out the contents, and was surprised to find over two dozen healthy-looking pupæ, which evidently intend to lie over to next season. I may add that we left Sheerness on the 14th August for Bermuda and Halifax, where we had some hot weather, and returned to Portsmouth on the 25th instant.

The number of species experimented upon were not sufficient to enable any important conclusions to be drawn, although it would appear that a tolerably quick change from a very cold to a very warm climate induces early hatching; but that different species are differently affected, *Eupithecia* and *Hadena*, for instance, appearing before *Tæniocampa*, and *Pelurga** being in no way influenced.

It is an interesting subject, and I hope to be able to carry out experiments on a larger scale during the coming winter.

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* Since this paper was written the following note has been received from Mr. G. F. Mathew:—

H.M.S. 'Tyne,' Portland, Oct. 2nd, 1891.

My dear Sir,—Since I sent that little paper I have bred two *Pelurga comitata*, one on 30th September, the other on 1st inst., from the larvæ found thirteen months ago. They are very eccentric in their manner of appearance. Perhaps you would kindly add a footnote to my paper, and oblige yours, in great haste,

H. Goss, Esq. GERVASE F. MATHEW.

XXII. *Descriptions of new species of holophthalmous* Ascalaphidæ. By Robert McLachlan, F.R.S., &c., Treasurer, Ent. Soc. Lond.

[Read November 4th, 1891.]

The species herein described are as follows:—

Ptynx furciger. Arizona.
Campylophlebia (n. g.) *magnifica*. Cameroons.
Idricerus Elwesii. Darjeeling.
Idricerus japonicus. Japan.
Idricerus (?) *Albardanus*. Mesopotamia.

Four of these are in my collection; the other has been obligingly communicated by Mr. Herman Albarda, of Leeuwarden.

The generic term *Cormodes*, McLach. (preoccupied), is changed to *Allocormodes*.

Ptynx furciger, n. sp.

Antennæ yellowish-brown, paler at the base of each joint and before the club, which is blackish-brown, paler in the concave portion above. Head above blackish, with broad yellow eye-margins, clothed with dense blackish-cinereous pilosity; face wholly pale yellow, with whitish-yellow pilosity; mandibles shining piceous at the tips; palpi pale yellow, the terminal joint more testaceous; back of head pale yellow. Eyes blackish, finely reticulated with cinereous. Thorax blackish above, with blackish-cinereous pilosity, and two subparallel distant yellow longitudinal bands; sides and pectus very densely clothed with hoary white silken pilosity; some yellow spots under the wings. Legs clothed with hoary pilosity, tibiæ and tarsi with black spines; femora black, yellow at the apex; tibiæ yellow, fuscescent internally; tarsi and claws piceous. Abdomen slender, slightly shorter and more robust in the ♀; colour more or less cinereous: in the ♂ the 2nd and 3rd segments above are clothed with dense straight outstanding cinereous hairs, and *at the end of the third segment there is a narrow semi-erect yellow dorsal valve or process* (about 2 mm. long), concave beneath, narrow at the base, widened at the apex, which is very deeply notched or slightly furcate; on the 4th and

5th segments, and indistinctly on those succeeding, there is, above, a velvety black interrupted line on each side, and a similar transverse line at the end of the segments, interrupted in the middle; beneath, the basal segments are yellowish, with three shining black interrupted lines, and similar black semicircles at the segmental divisions; apex above yellowish, and there is a pair of short, stout, yellow appendages, somewhat thickened towards the obtuse apices, and with strong black outstanding hairs; in the ♀ the black velvety lines above are more defined and complete. Wings of the form and structure usual in the genus; vitreous, the subcostal area infuscated; neuration black, radius and a few basal nervules whitish-yellow; pterostigma consisting of a small infuscate mark on thickened nervules (not strictly defined); 40—45 ante-pterostigmatical costal nervules, whereof the last 3 or 4 are often connected; post-stigmatical area with 4—5 oblique rows of cellules. Length of body, 31—32 mm. Expanse of wings, 80—85 mm.

Hab. Arizona (*H. K. Morrison*). Three males, two females, in my collection.

Of the same size and form as *P. appendiculatus*, F., and much resembling it, differing slightly in the costal area not being infuscate, and especially in the furcate process on the dorsum of the 3rd abdominal segment in the ♂, of which there is not a vestige in *P. appendiculatus*. There is similarity in the colour of thorax, legs, and wings to *P. juvenilis*, McLach., from Texas. The single type of this has lost the abdomen; its size is so much smaller (exp. 70 mm.) that it can scarcely be the same. Moreover, in a letter received from Dr. Hagen soon after the publication of my 'Classification of the *Ascalaphidæ*,' he gives a running commentary on the results of a comparison of that work with the materials in his collection, and says he possesses one ♂ of *A. juvenilis* from Texas, and makes no mention of the structural peculiarity in the dorsum of the abdomen, which he would certainly have done had it been present.

Campylophlebia,* n. g.

Wings elongate, broad, of nearly equal form, the posterior somewhat narrower and shorter; the anterior excised at the extreme

* In placing this genus in the *Holophthalmi* it is necessary to state that the eyes in the single type are badly crushed, but in one of them I can see nearly the whole of the basal circumference, and do not detect indications of any dividing line.

base, not appendiculate, the anal angle not prominent; a broad, brown, *blistered* fascia occupying most of the apical portion of each wing, and a similar blistered mark at the end of the two cubiti, the neuration in these blistered portions being extremely dense, and composed of a multitude of minute cellules, neuration otherwise open; costal nervules in anterior wings not numerous, after the base arranged irregularly in pairs or threes; in both pairs of wings the ends of the longitudinal nervures where they enter the dark blistered portion are bent downwards in a sinuous manner, the lower branches of the sector radii, and the ends of the two cubiti, entering the inner margin nearly vertically, but very sinuous; the branch of the lower cubitus ill-defined: in the posterior wing the costal margin is slightly elevated before the apex (scarcely so in anterior). Antennæ nearly two-thirds the length of the anterior wings, straight, simple; club gradual and elongate. Thorax very slightly hairy. Abdomen short, moderately stout. Legs short; spurs of posterior tibiæ scarcely longer than first two tarsal joints.

The magnificent insect upon which this genus is founded is amongst the largest of described *Ascalaphidæ*, being equalled only by some forms of *Haploglenius*.

The foot-note indicates the bare possibility of its not being truly holophthalmous. In any case it forms a remarkable genus, on account of the blistered coloured portions of the wings, and the very dense reticulation and abrupt downward direction of the ends of the principal nervures in these coloured portions. Such "blistering" occurs in the markings of some *Myrmeleonidæ*, *Chrysopidæ*, &c., and is there, as here, accompanied by dense network, the physiological significance of which remains to be explained.

Campylophlebia magnifica, n. sp.

Antennæ pale brown, the base of each joint yellowish; club dark brown. Head (much crushed) cinereous (varied with black ?); a dense tuft of black hairs between the antennæ; face yellowish (varied with black ?). Eyes bronzy black. Thorax cinereous above, with blackish spots on the lobes; beneath blackish, with yellowish spots on the sides below the wings; metasternum cinereous. Legs pale yellow; anterior tibiæ blackish externally; tarsi black; spurs and claws dark piceous; coxæ and base of femora clothed with hoary hairs. Abdomen above brown, the greater part of the 2nd and 3rd segments, and a large space on the 4th, cinereous; beneath blackish, the anterior half of the 3rd

segment yellowish-cinereous (the whole abdomen discoloured in drying). Wings vitreous with brown, mostly paired, oblong spots in the subcostal area in both wings, except towards the base; the apex occupied by a broad irregular brown blistered band, densely reticulated by whitish yellow, and bearing two large whitish spots on the apical margin, divided by a narrow prolongation of the dark band; a nearly vertical blistered brown line between the ends of the two cubiti on the inner margin, with a slight darker clouding outside the apex of the line; subcosta conspicuously pale yellow, with black lines beneath the paired (or grouped) costal nervules; neuration otherwise mostly black (except at the apex), but several of the longitudinal nervures, and their chief branches, are finely yellowish; pterostigma pale yellowish, with 5 or 6 furcate or bifurcate nervules: costal nervules about 40 in the anterior wings, the first eight regular, afterwards they are grouped in pairs or threes, with long free spaces between the groups (in the posterior wings this grouping is less defined); post-stigmatical area broad, occupied by about 6 rows of minute cellules; about 6 rows (5 in the posterior) of somewhat irregular cellules between the lower cubitus and the inner margin; sector radii with two principal branches, but the upper is tri- or quadri-furcate. Length of body, 31 mm. Expanse of wings, 115 mm. Length of anterior wing, 55 mm.; greatest breadth, 15 mm. Length of posterior wing, 52 mm.

Hab. West Africa (Cameroons, *D. G. Rutherford*). One ♀ in my collection.

Allocormodes, new name.

= *Cormodes*, McLach., Journ. Linn. Soc. Lond., Zool., xi., p. 239 (1871); preoccupied by Pascoe in Coleoptera, Journ. of Entomol., i., p. 44 (1861).

Idricerus Elwesii, n. sp.

Antennæ yellowish, narrowly annulated with black at the sutures; club dark brown. Head black, with dense black villosity above, and between the antennæ; face black; labrum yellow; palpi testaceous; eyes bronzy. Thorax greyish-brown, slightly yellowish beneath, with blackish pubescence above, which becomes whitish on the pleuræ and breast. Legs reddish, base of tibiæ, and the tarsi wholly, black; spurs dark piceous, those on the posterior tibiæ scarcely so long as the first two tarsal joints; claws dark piceous. Abdomen stout in the basal half, afterwards more slender to the apex, which is obtuse: colour above velvety black, with a piceous tinge; beneath yellowish-ochreous in the basal half, with

a broad central blackish longitudinal band, glaucous bluish in the attenuated apical portion. Wings vitreous; the inner margin dilated before the termination of the cubiti; anal angle of anterior rounded, thickened, not followed by an excision: neuration rather open, blackish, but all the principal longitudinal nervures are yellowish; pterostigma small, nearly vitreous, but with three yellowish nervules, of which the first is furcate; about 35 costal nervules before the pterostigma; post-stigmatical area with three rows of hexagonal or pentagonal cellules, those on the costal margin the smallest; four rows of cellules between the lower cubitus and the inner margin. Length of body, about 35 mm. (distorted). Expanse of wings, 82 mm. Length of anterior wing, 39 mm.; greatest breadth, 11 mm. Length of posterior wing, 33 mm.

Hab. Darjeeling (*H. J. Elwes*, July, 1886); one ♀ in my collection, kindly given to me by Mr. Pascoe.

Agreeing in general form and structure with the typical *I. decrepitus*, Wlk.

It cannot be identical with the lost "*Ascalaphus (Haploglenius) obscurus*," Westw. (Cab. Or. Ent.), also an Indian species, which, according to the short diagnosis, should be very much smaller, differently marked on the body, and having the claws longer than the tarsi (in *I. Elwesii* they are scarcely longer than the last tarsal joint), &c.

Idricerus japonicus, n. sp.

Antennæ blackish-piceous, the club deep black. Body black. Head above and between the antennæ clothed with dense black pilosity, which becomes cinereous on the face; clypeus, labrum, and lower orbits yellow. Eyes bronzy (perhaps reddish or purplish in life). Thorax with black pilosity above, and cinereous on the sides and beneath (often nearly wholly cinereous in the ♀). Legs shining black, reddish at the junction of femora and tibiæ; spurs of the posterior tibiæ as long as the first two tarsal joints. Abdomen glaucous beneath, with black segmental divisions; above it is black, with short concolorous hairs, and in some individuals there is a reddish mark at the sides of the basal segmental divisions: the abdomen is comparatively slender in the ♂, but enormously stout in the ♀ (perhaps only before the eggs are laid): in the ♂ there are no prominent anal appendages, but the ventral surface ends in a small triangular plate. Wings having the costal and inner margins nearly parallel, the anterior pair not appendiculated, but the anal angle is prominent; vitreous, the subcostal area often slightly infuscated (in very adult individuals the wings are sometimes

wholly or in part tinged with fuliginous) : neuration black, network moderately dense : pterostigma small, well-defined, its outer side very oblique, dark brown, with 3 or 4 deep black nervules : 26—35 ante-pterostigmatic costal nervules in the anterior wings ; post-stigmatical area broad, with three rows of regular angular cellules, of which the costal row is very small, and the others large (the lower the largest) ; 4—5 rows of cellules between the lower cubitus and the inner margin in the anterior wings, 3 in the posterior. Length of body, 29—34 mm. Expanse of wings, 72—90 mm. Length of anterior wing, 34—42 mm. ; greatest breadth, 8—10 mm. Length of posterior wing, 28—35 mm.

Hab. Japan (*Pryer, Lewis, &c.*), where it is apparently very common. I have ten examples of both sexes before me, and have seen many more.

This may be considered quite congeneric with the typical *I. decrepitus*, Walker ; the spurs of the tibiæ are slightly longer, and the post-stigmatical area is broader (it contains only two rows of cellules in *I. decrepitus* and *I. sogdianus*).

Idricerus (?) *Albardanus*, n. sp.

(Antennæ wanting). Head above fuscescent, with obscure paler spots, clothed with dusky cinereous pilosity, and a tuft of whitish hairs between the antennæ : face yellowish-grey, a fringe of long curved fuscous hairs on the clypeus ; palpi concolorous with the face. Eyes black, densely reticulated with grey, the reticulation coarser and more open in the lower portion. Thorax fuscous, densely clothed with dusky cinereous pilosity above, which becomes almost white on the breast and beneath ; above are indications of yellowish markings, especially on the scutellum of the meso- and meta-nota. Legs pale yellow, with long dense whitish hairs on the femora, becoming mixed with blackish on the tibiæ ; tarsi faintly annulated with brownish at the extremity of the first four joints ; spurs and claws testaceous Abdomen slender, blackish, sparsely clothed with short blackish hairs ; above, the segmental divisions (except in apical portion), and the base of segments 4—6, are yellowish white, and beneath, the apical half of segments 3—4 is of the same colour : on the dorsum of the abdomen, segment 3 is produced at the apex into a *semi-erect, narrowly triangular acute valve-like process*, which is concave and pale yellowish if viewed from behind, viewed in front it is fuscescent, densely clothed with black hairs, with pale yellowish margins and apex ; apex of abdomen with black spinose hairs ; no prominent anal

appendages. Wings uniformly dark fuliginous, darker towards the base, with slightly brassy reflections in certain lights; pterostigma small, but conspicuously whitish, traversed by 3 or 4 dark nervules: neuration black, the whole of the transverse nervules margined with smoky blackish; about 35 costal nervules before the pterostigma in the anterior wings; nervules of the post-stigmatical area (confused with the pterostigma) 6 or 7, long, curved, forked at the ends, with sparse cross nervules, forming transverse oblong cellules: a triangular tooth near the base of the inner margin of the anterior wings, sharply defined, narrow, veined, subobtuse, the base of the inner margin being deeply and semicircularly excavated before the tooth. Length of body, 36 mm. Expanse of wings, 69 mm. Length of anterior wing, 32 mm.; greatest breadth, 10½ mm. Length of posterior wing, 29 mm.

Hab. Mardin in Mesopotamia; one ♂ in the collection of Mr. Albarda, of Leeuwarden.

When defining the genus *Idricerus* in my 'Classification of the Family *Ascalaphidæ*' (Journ. Linn. Soc., Zool., vol. xi.), I placed it, in the tabular synopsis, in a section in which the anterior wings are "haud appendiculatæ"; but I had already shown that in at least one species of *Haploglenius* (likewise holophthalmous) the wings are exceptionally appendiculate: in effect it is sometimes difficult to draw the line between what in some cases is only a prominent angle, and in others a tooth. I leave the insect doubtfully in *Idricerus*.

This is a very striking species from its coloration (in less mature individuals the wings are probably paler), and also from the process on the dorsum of the abdomen in the ♂, but approach towards, or modifications of, such a formation, are not uncommon in *Ascalaphidæ*, and nearly a parallel may be found in *Ptynx furciger*, p. 509, *ante*.

XXIII. *Descriptions of four new species of the genus* Fulgora. By W. L. Distant, F.E.S.

[Read November 4th, 1891.]

Plate XX.

On returning from the Transvaal, among other insects which I found had been sent to me during my absence, I had the pleasure to discover four new species of the genus *Fulgora*, or the true so-called "lantern flies," descriptions of which I now beg to lay before the Society.

Fulgora karenia, n. sp. (Pl. XX., figs. 2, 2*a*).

Head and cephalic process, thorax above and beneath, and the femora, castaneous; tibiæ, tarsi, and the abdomen above and beneath, pitchy; posterior margins of the abdominal segments and base of the abdomen above ochraceous. Tegmina black, thickly covered with the reticulated venation, which is ochraceous, and with the following ochraceous markings, *viz.*, three macular transverse fasciæ on basal half, followed by a transverse series of three small spots widely separated, a broad transverse fascia near apical area, between which and apex are a few small scattered spots. Wings very pale bluish, the apex and outer margin, narrowing to anal angle, very broadly black. The cephalic process is long, slender, unicolorous, or very faintly paler at apex, which is not thickened, and concavely ascendant. Long. from eyes to apex of abdomen, 25 millim. Cephalic process at angle from eyes to apex, 20 millim. Exp. tegm., 84 millim.

Hab. Burma, Karen Hills (*Doherty*).

This species is allied to the Bornean *F. intricata*, Walk., from which it differs by the longer, more slender, and not apically thickened cephalic process, and by the broad transverse fascia near the apical area of the tegmina.

Fulgora pythica, n. sp. (Pl. XX., figs. 3, 3*a*).

Cephalic process green, minutely spotted with creamy white, its apex ochraceous; thorax above and beneath, legs, and abdomen

above, dull obscure castaneous; abdomen beneath pitchy. Tegmina with the basal half blackish, thickly covered with the reticulated venation, which is ochraceous, remaining tegminal area wholly ochraceous; the dark reticulated basal half containing four transverse series of obscure darkly margined spots, followed on the ochraceous area by a transverse series of six small but very prominent white spots, the lower two of which are somewhat fused; apical area with scattered pale spots. Wings bluish green, the apex and outer margin, narrowing to the anal angle, very broadly black. Long. from eyes to apex of abdomen, 25 millim. Cephalic process at angle from eyes to apex, 19 millim. Exp. tegm., 84 millim.

Hab. ?.

This species is allied to *F. pyrorhyncha*, Don = *F. amplectens*, Atkins, from which it differs by the shorter and more slender cephalic process, and by the transverse series of white spots to the tegmina.

As this species is figured, I describe it, though unlocalised, a course I should not have otherwise pursued.

Fulgora effusa, n. sp. (Pl. XX., figs. 4, 4*a*).

Cephalic process dark ochraceous, its apical half olivaceous; thorax above and beneath, and legs, dark ochraceous; abdomen pitchy brown. Tegmina dull ochraceous, thickly covered with the reticulated venation, which is pale stramineous; on basal two-thirds of tegmina are four transverse series of pale creamy spots, and some ten small spots of the same colour are scattered on the apical area. Wings bluish, with the apex and outer margin, narrowing to anal angle, very broadly blackish. The cephalic process is distinctly constricted a little beyond middle, and is then thickened and ascendant. Long. from eyes to apex of abdomen 20 millim. Cephalic process at angle from eyes to apex, 12 millim. Exp. tegm., 70 millim.

Hab. Borneo.

This species is somewhat allied to *F. whiteheadi*, Dist., from which it differs by the more dilated apex of the cephalic process, and by the bicoloration of the same. The transverse pronotal fascia in *F. whiteheadi* is absent in *F. effusa*, and the colour of the spots and ground surface of the tegmina is also different.

Fulgora bullata, n. sp. (Pl. XX., figs. 1, 1*a*).

Cephalic process black, with its base pale greenish ochraceous; head and thorax above pale greenish ochraceous; pronotum with three black spots, the central largest and somewhat duplex; mesonotum with two central black spots on anterior margin, two black spots on each lateral margin, and a similar spot at apex; abdomen above black; face, rostrum, sternum, and coxæ ochraceous; legs red, bases and apices of anterior and intermediate tibiæ, apices of posterior tibiæ, and the tarsi, black; abdomen beneath black, the apex and posterior segmental margins ochraceous. Tegmina greenish ochraceous, an irregular transverse fascia beyond centre, and the apex pitchy, the first containing six, the last some eight ochraceous spots, the basal area somewhat thickly covered with small black spots, and with scattered rounded and black margined spots. Wings bluish green, with the apex broadly black, the posterior margin narrowly of the same colour, and with discal black streaks and patches. The cephalic process is slender and almost perpendicular. Long. from eyes to apex of abdomen, 12 millim. Cephalic process at angle from eyes to apex, 6 millim. Exp. tegm., 44 millim.

Hab. Burma, Ruby Mines (*Doherty*).

This species is allied to *F. gemmata*, West., from which it differs by the black and perpendicular cephalic process, and the different colour and pattern of the tegmina.

Explanation of Plate XX.

Fig. 1. *Fulgora bullata;* 1*a*, cephalic process.
2. ,, *karenia;* 2*a*, ,,
3. ,, *pythica;* 3*a*, ,,
4. ,, *effusa;* 4*a*. ,,

XXIV. *On the South American species of* Diabrotica. Appendix.

By Charles J. Gahan, M.A., F.E.S., Assistant in the Zoological Department, British Museum.

[Read November 4th, 1891.]

The following list contains the names of species, a few of which, through oversight, have been omitted from the lists given by Mr. Baly and myself, but the great majority of which have been reserved for treatment in this Appendix. It can be readily understood that many of the older descriptions, either from their brevity or their want of structural detail, do not admit of the exact determination of the species upon which they were based. The difficulty becomes all the greater in a group like the present, in which many of the species have the closest resemblance in colour and markings, but differ by structural characters, such as the relative lengths of the joints of the antennæ, the form of the tibiæ, the punctuation of the elytra, &c. These descriptions are in some cases, however, sufficiently detailed to enable me to give the position of the species with a near approach to accuracy. Some of the names must take priority of those given by Mr. Baly, who had probably been unable to see the original descriptions. Where the name of a species is not followed by a note, it may be understood that I could not form any conclusion as to its identity.

D. abdominalis, Jacoby, Cist. Ent., ii. (1879), p. 525. (Sect. 2. Probably nearest allied to *D. dimidiata*, Baly). Peru.

D. abrupta, Fabr., Syst. Eleuth., i., p. 453; Oliv., Ent., vi., p. 653, t. 4, fig. 68. (*? = D. confraterna*, Baly. Sect. 1, No. 104).* Amer. mer.

* The number after a species signifies that it bears that number in either Mr. Baly's paper on the species of Section 1, or my paper on the species of Section 2.

D. admirationis, Oliv., Ent., iv., p. 654, t. 4, fig. 69. (Probably a variety of *D. scripta*, Oliv. Sect. 1, No. 9).' Guiana.

D. ambitiosa, Erichs., Wieg. Archiv., 1847, i., p. 166. (Probably near *D. Erichsoni*, Baly. Sect. 2, No. 30). Peru.

D. amplexa, Erichs., *l. c.*, p. 168. Peru.

D. angulicollis, Erichs., Schomb. Reis. Guyana, iii. (1848), p. 577. (This is one of the many varieties of *D. 10-guttata*, Oliv., Sect. 2, No. 76; it may be open to question whether Baly's determination of the latter species is correct). Brit. Guiana.

D. atriventris, Jacoby, P. Z. S., 1880, p. 606. (Sect. 2. Nearly allied to *D. divisa*, Baly, No. 136). Ecuador.

D. basalis, Jacoby, *l. c.*, p. 605, pl. 55, fig. 8. (To follow *D. divisa*, Baly. Sect. 2, Species No. 136). Ecuador.

D. biplagiata, Fauv., Bull. Soc. Linn. de Normandie, v. (1861), p. 324. (Appears to resemble *D. scripta*, Oliv. Sect. 1, No. 9). Cayenne.

D. bivittata, Fabr., Syst. Eleuth., i., p. 455. (This species appears twice, under *Diabrotica*, in Gemm. & Harold's Catalogue; first as a distinct species, and subsequently as a synonym, of *pallipes*, Oliv. But it cannot be identical with the latter, since it is described as having smooth elytra). Cayenne.

D. conciliata, Erichs., Wieg. Archiv., 1847, i., p. 167. Peru.

D. cyanipennis, Fabr., Syst. Eleuth., i., p. 451. Brazil.

D. decolor, Erichs., *l. c.*, p. 167. Peru.

D. dorsonotata, Fauv., Bull. Soc. Linn. Norm., v., p. 324. (*?=Cerotoma arcuata*, Oliv.). Cayenne.

D. ebræa, Fabr., Mant. Ins., i. (1787), p. 89; Syst. Eleuth., i., p. 459; *hebræa*, Oliv., Ent., vi., p. 656, t. 5, fig. 72. (*?=Neobrotica nigroguttata*, Baly, Journ. Linn. Soc., xix., p, 243). Cayenne.

D. fasciata, Kirsch., Berl. Ent. Zeit., xxvii. (1883), p. 200. (Sect. 2. Comes nearest to *D. imitans*, Jacoby, according to Kirsch.). Ecuador.

D. flava, Oliv., Encycl. Méth., vi. (1791), p. 586; Ent., vi., p. 618, t, 2, fig. 16. (*? Diabrotica*). Surinam.

D. flavonotata, Jacoby, P. Z. S., 1880, p. 604, pl. 55, fig. 7. (Sect. 2. Probably near *D. 10-guttata*, Oliv.). E. Ecuador.

D. gracilenta, Erichs., *l. c.*, p. 166. (*?=D. limitata*, Baly. Sect. 1. The name *limitata* had been previously used for another species of this genus; see below. Peru.

D. instabilis, Harold, Mitt. Münch. Ent. Ver., 1877, p. 111. Colombia.

D. limitata,* Sahlb., Peric. Ent. Spec. Insect. (1823), p. 66, pl. 4, fig. 2; sub. *Cerotoma*, in Cat. Gemm. and Harold. (=15-*punctata*, Germ. (1824). Sect. 1, Species No. 4).

D. lucifera, Erichs., *l. c.*, p. 166. (Possibly a variety of *D. elegans*, Baly. Sect. 1, No. 57). Peru.

D. marginalis, Fabr., Syst. Eleuth., i., p. 454. Amer. mer.

D. marginata, Harold, Coleopt., Hefte xiii. (1875), p. 91. (Sect. 1. A very distinct and easily recognised species, which seems to have been accidentally omitted from Mr. Baly's list). Bahia.

D. melanopa, Erichs., *l. c.*, p. 167. (*?=D. fulvescens*, Baly. Sect. 1, No. 139). Peru.

D. modesta, Fabr., Syst. Eleuth., i., p. 451. Amer. mer.

D. nigroplagiata, Jacoby, P. Z. S., 1880, p. 604, pl. 55, fig. 9. (Sect. 2. Near *D. divisa*, Baly). Ecuador.

D. pallipes, Oliv., Encyclop. Method., vi., p. 590; Ent., vi., p. 633, pl. 3, fig. 39. (Sect. 2. Probably = *D. Theimei*, Baly. Species No. 10). Cayenne.

D. peruana, Jacoby, P. Z. S., 1878, p. 151. (The description applies in most particulars to a species very closely allied to *D. Hebe*, Baly. In a variety of this species the elytra are entirely pale yellow).

D. prædita, Erichs., *l. c.*, p. 166. Peru.

D. præstans, Erichs., *l. c.*, p. 167. Peru.

D. prodiga, Erichs., *l. c.*, p. 168. Peru.

D. quadrimaculata, Jacoby, P. Z. S., 1880, p. 605, pl. 55, fig. 5.

D. quadrilineata, Latr., in Humb. et Bonpl., Obs. de Zool., vol. ii., p. 69, pl. 34, fig. 10. (=*D. albidovittata*, Baly. Sect. 2, No. 5).

D. quadrivittata, Latr., *l. c.*, p. 25, pl. 31, fig. 12. (*?=D. similata*, Baly. Sect. 2, No. 16).

D. quinquelineata, Latr., *l. c.*, p. 70, pl. 34, fig. 11. (=*D. alternata*, Baly. Sect. 2, No. 56).

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* *D. litterata*, Sahlb., *l. c.*, p. 70, pl. 4, fig. 5. (= *D. delineata*, Jac., Biol. Cent. Am.). Mexico.

D. ruficollis, Fabr., Syst. Eleuth., i., p. 452.	Amer. mer.
D. rufina, Erichs., *l. c.*, p. 168.	Peru.
D. sanguinicollis, Jacoby, Cist. Ent., ii., p. 524. (? Sect. 2).	Peru.
D. scapularis, Bohem, Res. Eugen., p. 179.	Rio Janeiro.
D. suturalis, Oliv., Encyclopédie Méthodique, vi., p. 591. (? Sect. 2. "Resembles *D. vittata*, Fabr., and *D. pallipes*, Oliv.").	Cayenne,
D. terminalis, Jacoby. Cist. Ent., ii. (1879), p. 525. (Sect. 2).	Peru.
D. togata, Harold, Col., Hefte xiii., p. 92.	Peru.
D. trifasciata, Fabr., Syst. Eleuth., i., p. 452.	Amer. mer.
D. variolosa, Jacoby, P. Z. S., 1878, p. 151. (Sect. 1. "Allied to *D. marginata*," and to *D. chrysopleura*, Harold).	Ecuador.
D. varipes, Bohem., *l. c.*, p. 180. (=*D. perplexa*, Baly. Sect. 2, No. 18).	Rio Janeiro.
D. zonata, Harold, *l. c.*, p. 91. (This is a variety of *D. adonis*, Baly. Sect. 2, No. 35).	Colombia.

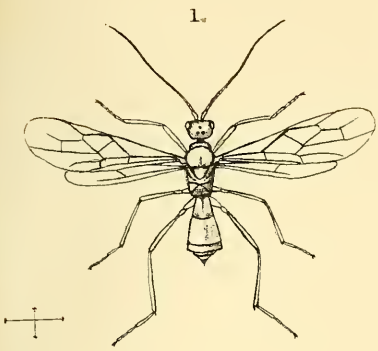
In *D. sexplagiata*, Jacoby, and *D. nigroguttata*, Baly, the claws of the tarsi are appendiculate. These two species have all the characters of *Neobrotica*. *D. 12-signata*, Baly, also has appendiculate claws, and must be removed from the genus.

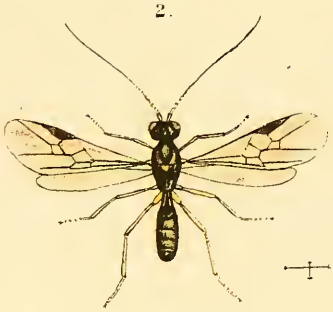
The following corrections must be made in Mr. Baly's paper, "On the South American species of *Diabrotica*. Part I." (Trans. Ent. Soc. Lond., 1890):—Page 48, under Species 85, for Ent. Soc. read Linn. Soc. P. 57, Species 100, for *Diabrotica atrivittata* read *D. atrilineata*. P. 58, Species 102, for *atrilineata* substitute *atrivittata*, and delete the reference, "Ent. Month. Mag., xxv., p. 252." P. 67, Species 117, after *Hab.* read Cayenne, instead of Brazil, Rio Janeiro. (The single type-specimen is ticketed with the former locality). In the references in the same paper to Proc. Zool. Soc., 1889, for pp. 92, 93, 94, and 95, read respectively pp. 88, 89, 90, and 91.

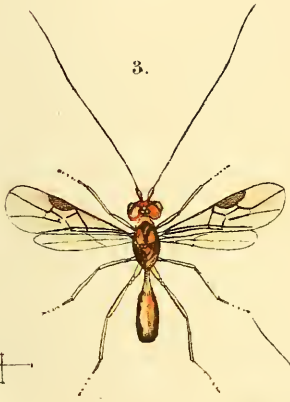
G.T.B. del.

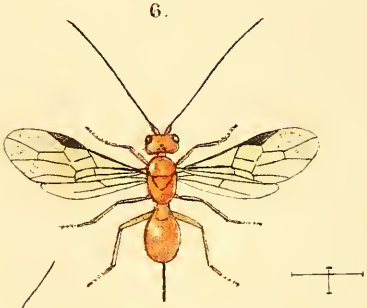
West, Newman, lith.

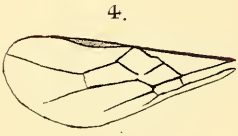
Genitalia of gynandromorphous Eronia hippia.

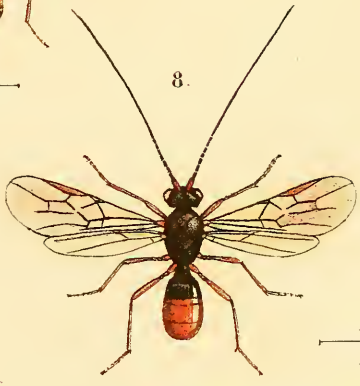












T. A. Marshall del.

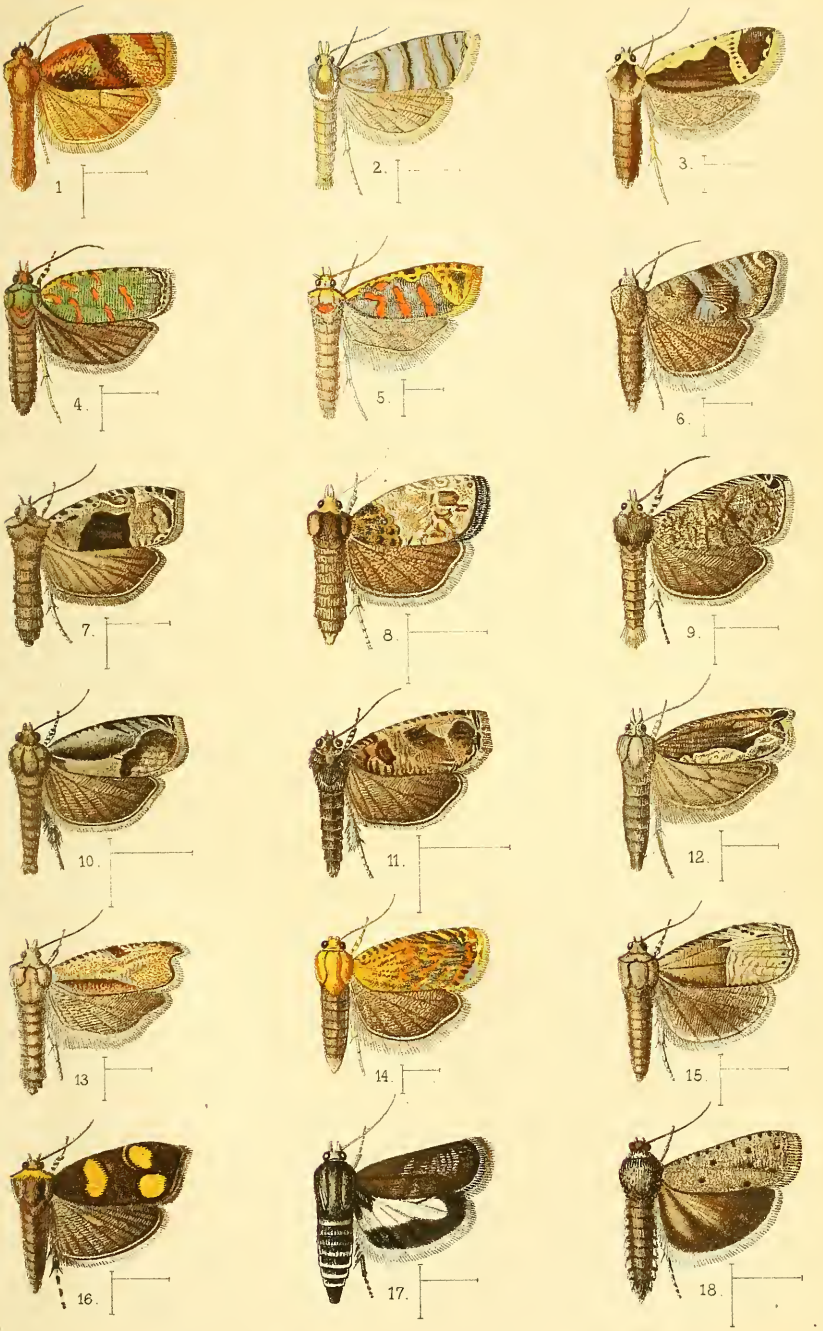
647. Mintern Bros. Chromo lith.

British Braconidæ

Explanation of Plate III.

Fig. 1. ♂ *Cacœcia occidentalis*, Wlsm.
2. ♂ *Argyrotoxa tigrina*, Wlsm.
3. ♂ *A. flavicostana*, Wlsm.
4. ♂ *A. viridis*, Wlsm.
5. ♂ *Dichelia albardana*, Snell.*
6. ♀ *Eudemis spissana*, Z.
7. ♀ *Eccopsis ? nebulana*, Wlsm.
8. ♀ *Penthina brevibasana*, Wlsm.
9. ♂ *Sericoris apicipunctana*, Wlsm.
10. ♂ *Phœcasiophora variabilis*, Wlsm.
11. ♂ *P. basicornis*, Wlsm.
12. ♀ *Phoxopteris oculifera*, Wlsm.
13. ♀ *P. falcata*, Wlsm.
14. ♂ *Coptoloma dimidiata*, Wlsm.
15. ♂ *Dichrorampha excisa*, Wlsm.
16. ♂ *Simæthis flavimaculata*, Wlsm.
17. ♂ *Atychia albiciliata*, Wlsm.
18. ♂ *Phycodes punctata*, Wlsm.

* See correction on p. 131.



F.W. Frohawk del. A.J. Wendel lith.

F.W.M. Trap Chromo.

African Micro-Lepidoptera.

Explanation of Plate IV.

Fig. 19. ♂ *Phycodes substriata*, Wlsm.
20. ♀ *P. albitogata*, Wlsm.
21. ♂ *Dissoctena affinis*, Wlsm.
22. ♀ *Autochthonus chalybiellus*, Wlsm.
23. ♂ *Barbaroscardia fasciata*, Wlsm.
24. ♂ *Tinea zebra*, Wlsm.
25. ♂ *Adela cuneella*, Wlsm.
26. ♂ *Nemotois humilis*, Wlsm.
27. ♀ *Hyponomeuta puncticornis*, Wlsm.
28. ♀ *Œta carteri*, Wlsm.
29. ♂ *Gymnogramma hutchinsoni*, Wlsm.
30. ♀ *Gelechia hutchinsonella*, Wlsm.
31. ♀ *G. palpigera*, Wlsm.
32. ♂ *Polyhymno cleodorella*, Wlsm.
33. ♂ *P. ? tenuis*, Wlsm.
34. ♀ *Strobisia metallica*, Wlsm.
35. ♀ *Brachycrossata marginata*, Wlsm.
36. ♂ *Odites natalensis*, Wlsm.

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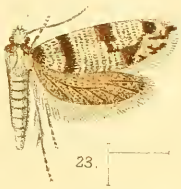
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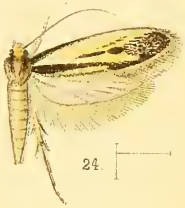
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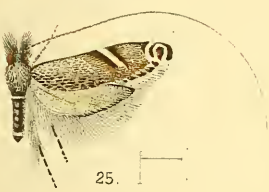
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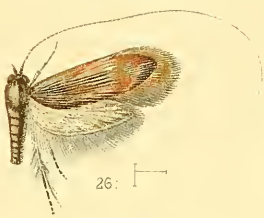
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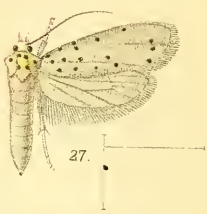
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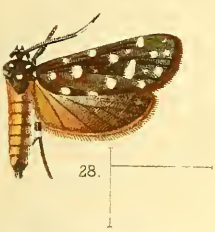
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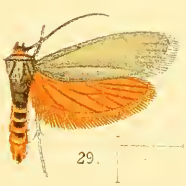
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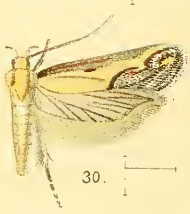
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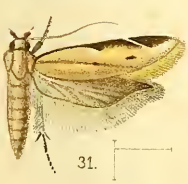
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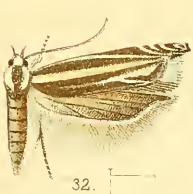
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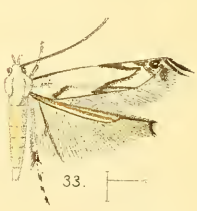
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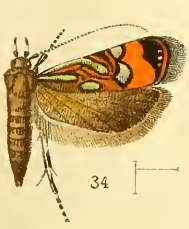
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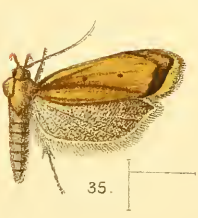
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F.W. Frohawk del. A.J. Wendel lith

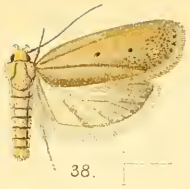
P.W.M. Trap Chromo.

African Micro-Lepidoptera.

Explanation of Plate V.

Fig. 37. ♂ *Odites carterella*, Wlsm.
38. ♀ *O.? inconspicua*, Wlsm.
39. ♂ *Lecithocera marginata*, Wlsm.
40. ♀ *L. flavipalpis*, Wlsm.
41. ♂ *Timyra extranea*, Wlsm.
42. ♂ *Apiletria acutipennis*, Wlsm.
43. ♂ *Ypsolophus gigas*, Wlsm.
44. ♂ *Y. marmoratus*, Wlsm.
45. ♀ *Anorthosia fracticostellus*, Wlsm.
46. ♂ *Nothris bryophilella*, Wlsm.
47. ♂ *Megacraspedus suffusellus*, Wlsm.
48. ♀ *Anarsia agricola*, Wlsm.
49. ♂ *A. inculta*, Wlsm.
50. ♂ *Ide complanella*, Wlsm.
51. ♀ *Depressaria inornatella*, Wlsm,
52. ♂ *Philobota virgo*, Wlsm.
53. ♂ *Glyphipteryx grapholithoides*, Wlsm.
54. ♀ *Laverna gambiella*, Wlsm.

37.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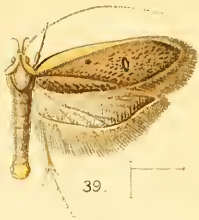
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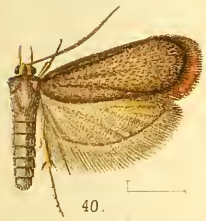
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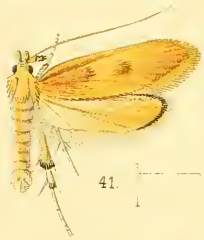
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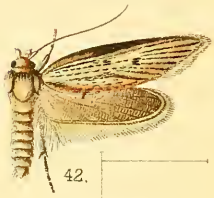
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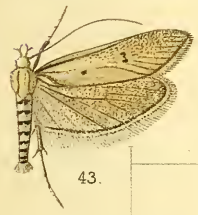
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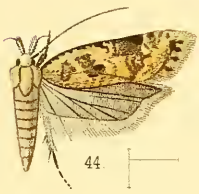
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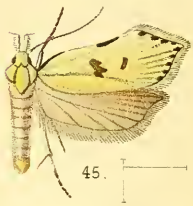
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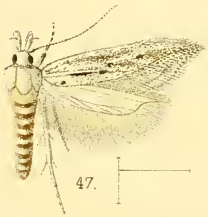
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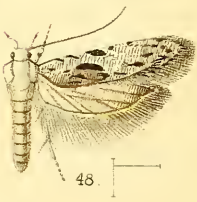
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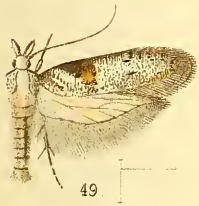
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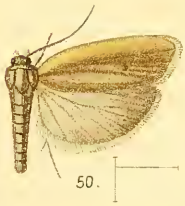
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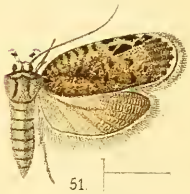
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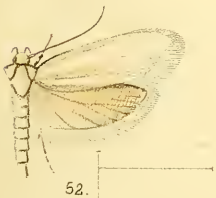
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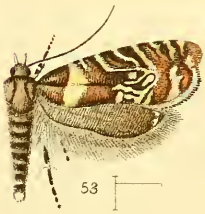
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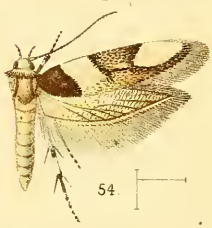

54.

F.W. Frohawk del. A.J. Wendel lith.

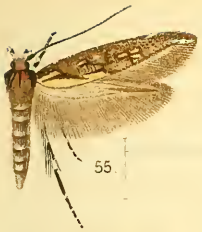
F.W.M. Trap Chromo.

African Micro-Lepidoptera.

Explanation of Plate VI.

Fig. 55. ♀ *Laverna quinquecristata*, Wlsm.*
56. ♂ *Stagmatophora fasciata*, Wlsm.
57. ♂ *S. distincta*, Wlsm.
58. ♂ *Pyroderces simplex*, Wlsm.
59. ♂ *Stathmopoda maculata*, Wlsm.
60. ♂ *S. crassella*, Wlsm.
61. ♂ *S. divisa*, Wlsm.
62. ♀ *Butalis subeburnea*, Wlsm.
63. ♂ *Blastobasis irroratella*, Wlsm.
64. ♂ *Cosmopteryx cognita*, Wlsm.
65. ♂ *Zarathra muricicoma*, Wlsm.
66. ♀ *Gracilaria punctulata*, Wlsm.
67. ♂ *G. apicistrigata*, Wlsm.
68. ♂ *G. bifasciata*, Wlsm.
69. ♂ *Microthauma metallifera*, Wlsm.
70. ♂ *Licmocera lyonetiella*, Wlsm.
71. ♂ *Oxymachæris niveocervina*, Wlsm.
72. ♂ *Micropostega æneofasciata*, Wlsm.

* This figure is not satisfactory, the shining pale ochreous raised tufts being wrongly represented by the use of gold [Wlsm.]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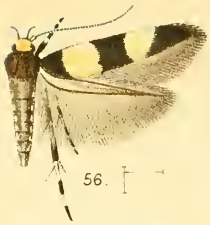
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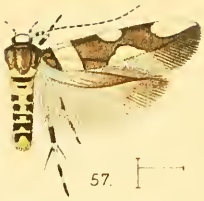
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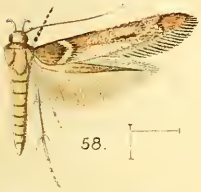
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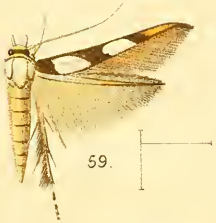
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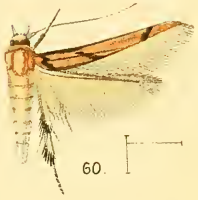
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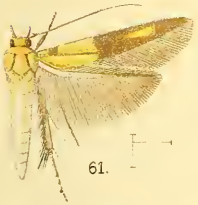
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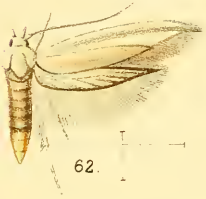
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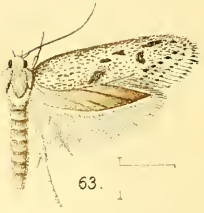
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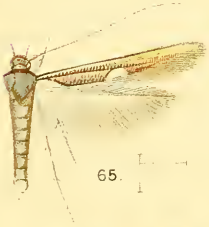
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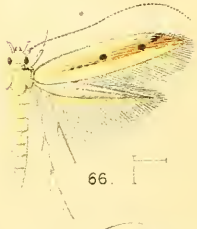
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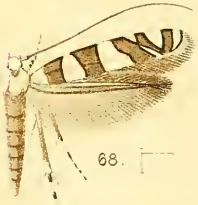
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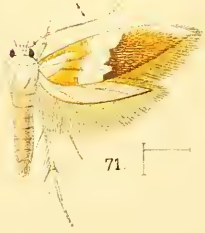

71.

72.

F.W. Frohawk del. A.J. Wendel lith.

P.W.M. Trap Chromo.

African Micro-Lepidoptera

Explanation of Plate VII.

* † 73. *Setomorpha rutella*, Z., ♀; *a* head, *b* fore wing, *c* hind wing.

* † 74. *Autochthonus chalybiellus*, Wlsm., ♀; *a* head, *b* fore wing, *c* hind wing.

* 75. *Scalidomia horridella*, Wkr., ♂; *a* head, *b* fore wing, *c* hind wing.

* † 76. *Barbaroscardia fasciata*, Wlsm., ♂; *a* head, *b* fore wing, *c* hind wing.

† 77. *Gymnogramma hutchinsoni*, Wlsm., ♂; *a* head, *b*, fore wing, *c* hind wing.

* 78. *Polyhymno luteostrigella*, Chamb., ♂ (United States); *a* head, *b* fore wing, *c* hind wing.

† 79. *Strobisia metallica*, Wlsm., ♂; *a* head, *b* fore wing, *c* hind wing.

* † 80. *Odites natalensis*, Wlsm., ♂; *a* head, *b* fore wing, *c* hind wing.

* 81. *Idiopteryx obliquella*, Wlsm., ♂; *a* head, *b* fore wing, *c* hind wing.

† 82. *Apiletria acutipennis*, Wlsm., ♂; *a* head (side), *b* head (front), *c* palpus, *d* fore wing, *e* hind wing.

† 83. *Timyra extranea*, Wlsm., ♂ ♀; *a* head ♂, *b* palpus ♂, *c* head ♀, *d* antenna ♂, *e* antenna ♀, *f* fore wing, *g* hind wing, *h* hind leg ♂, *i* hind leg ♀.

† 84. *Anorthosia fracticostella*, Wlsm., ♂; *a* head, *b* fore wing, *c* hind wing.

* 85. *Ide lithosina*, Z., ♀ (United States); *a* head, *b* fore wing, *c* hind wing.

* 86. *Cryptolechia straminella*, Z., ♂; *a* head, *b* fore wing, *c* hind wing.

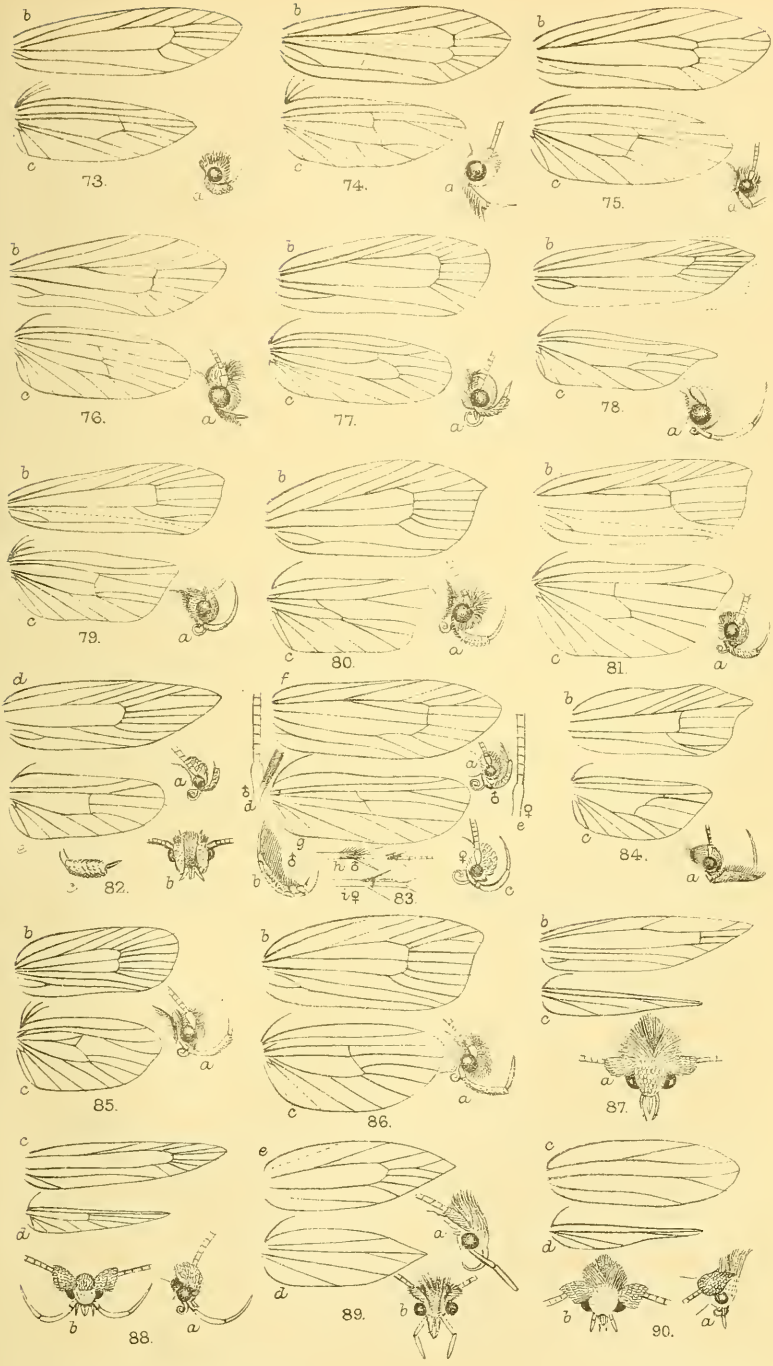
* † 87. *Microthauma metallifera*, Wlsm., ♂; *a* head, *b* fore wing, *c* hind wing.

* † 88. *Licmocera lyonetiella*, Wlsm., ♂; *a* head (side), *b* head (front), *c* fore wing, *d* hind wing.

* † 89. *Oxymachæris niveocervina*, Wlsm., ♂; *a* head (side), *b* head (front), *c* fore wing, *d* hind wing.

* † 90. *Micropostega æneofasciata*, Wlsm., ♂; *a* head (side), *b* head (front), *c* fore wing, *d* hind wing.

* = drawn from type of genus; † = drawn from type of species.
The figures are all enlarged.



Ino. Hartley Durrant del. F.W.Frohawk lith. West, Newman, imp.

African Micro-Lepidoptera.

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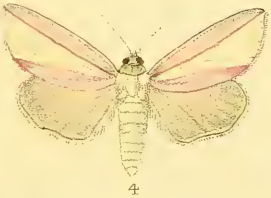
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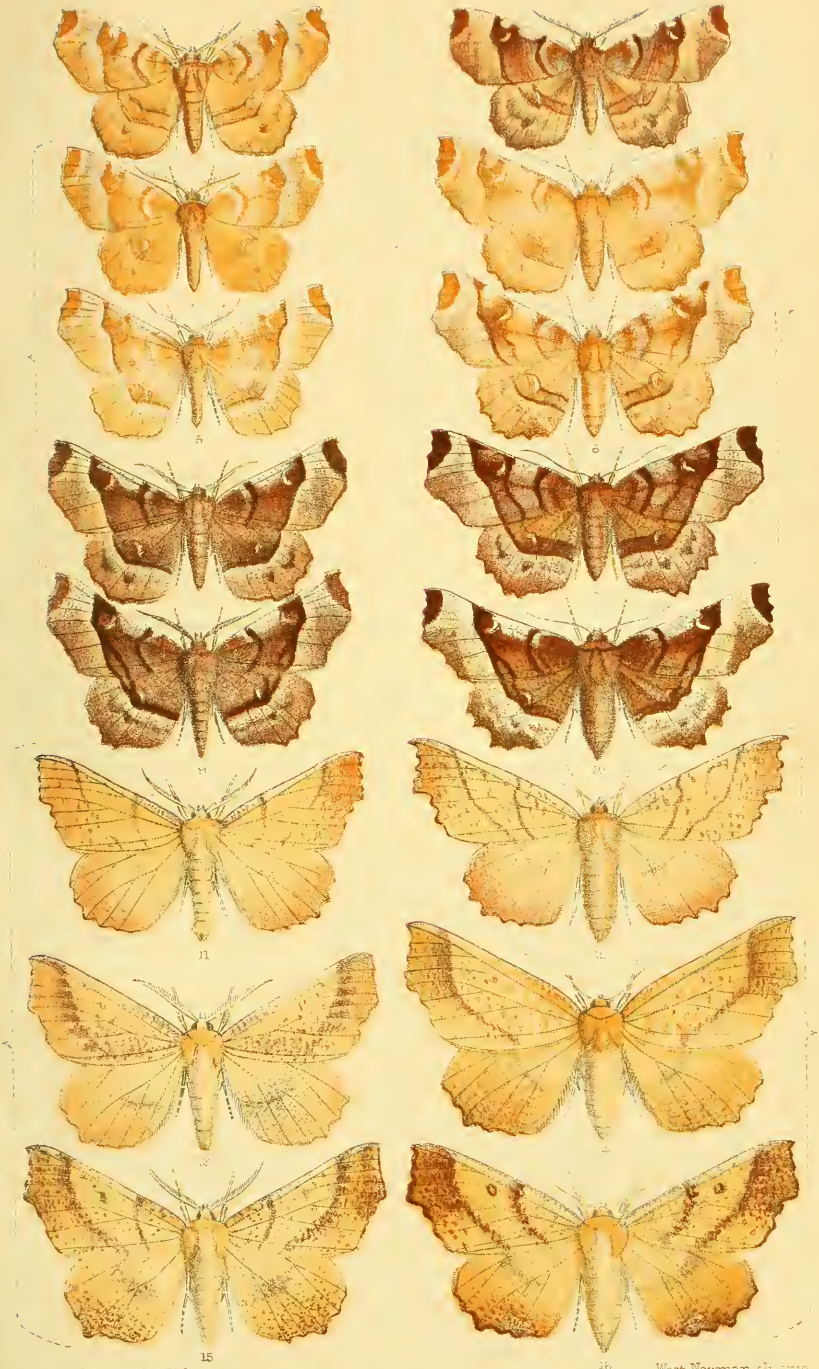
F.C. Moore del. et lith.

West, Newman imp.

S. Indian Moths.



F.W.Frohawk. del. et lith.

West, Newman. chr. print.

Varieties caused by temperature.

W. Purkiss del. et lith.

West, Newman imp.

New Species of Hypochrysops.

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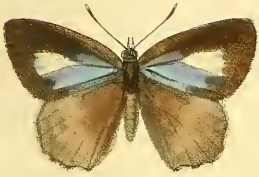

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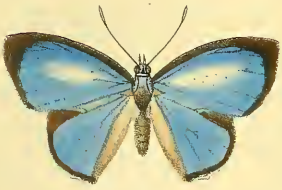

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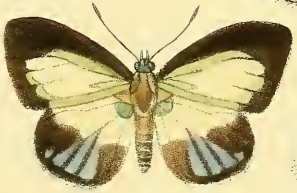

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W. Purkiss del et lith.

West, Newman imp

New Species of Hypochrysops.

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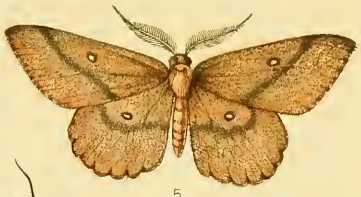
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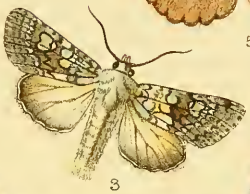
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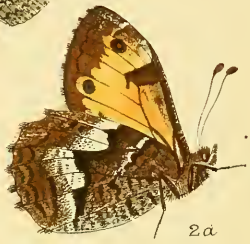
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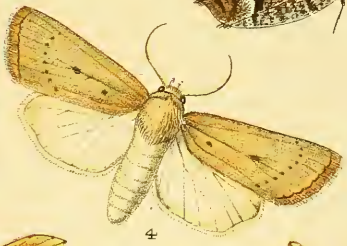
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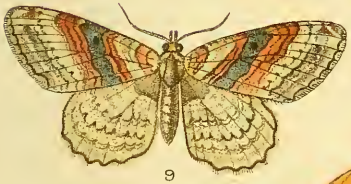
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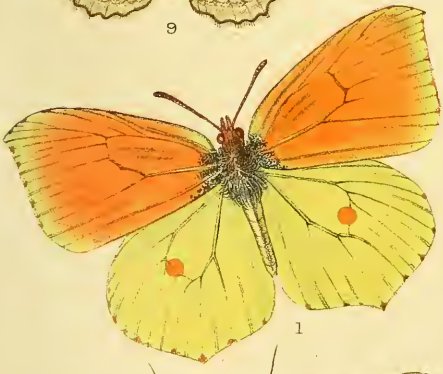
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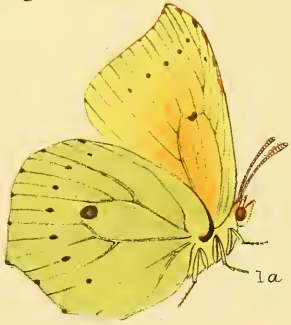
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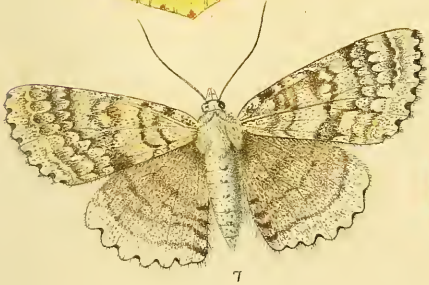
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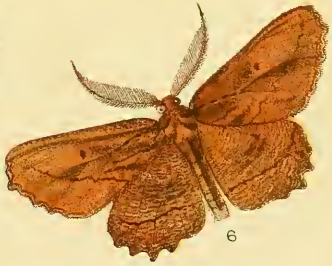
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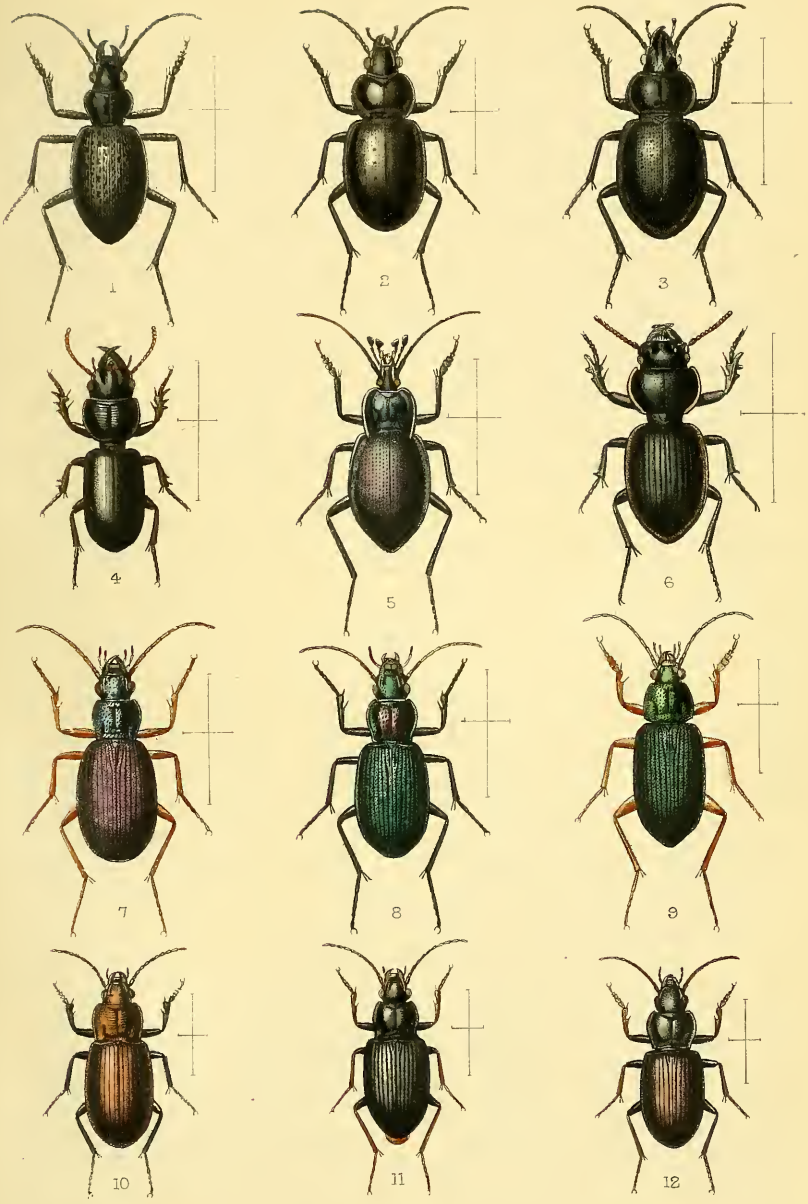
W. del

West, Newman chromo

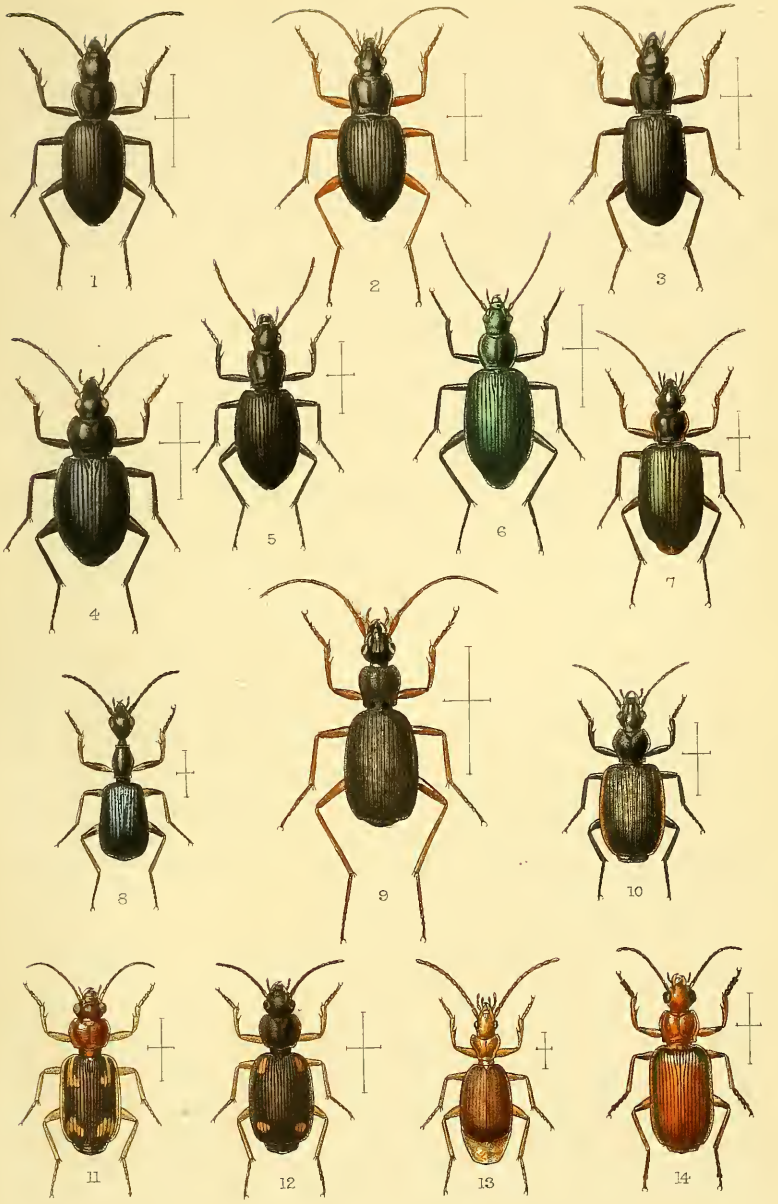
Lepidoptera from Madeira.



W. Purkiss del. et lith.

West, Newman imp.

Additions to the Carabideous Fauna of Mexico.



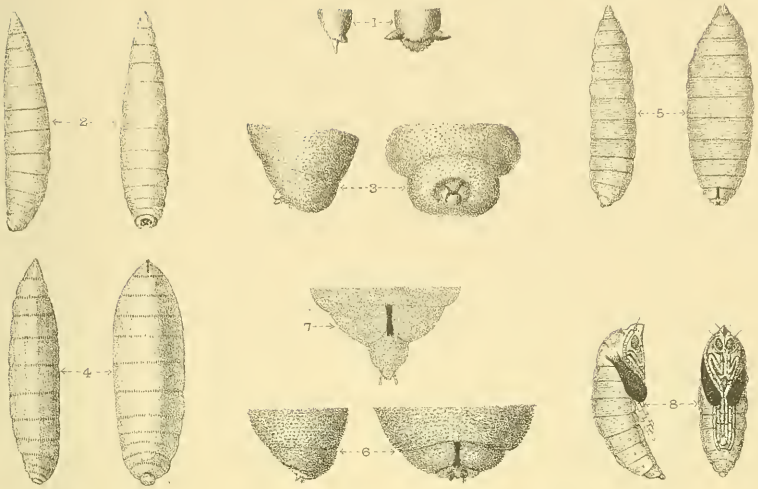
W. Purkiss del. et lith.

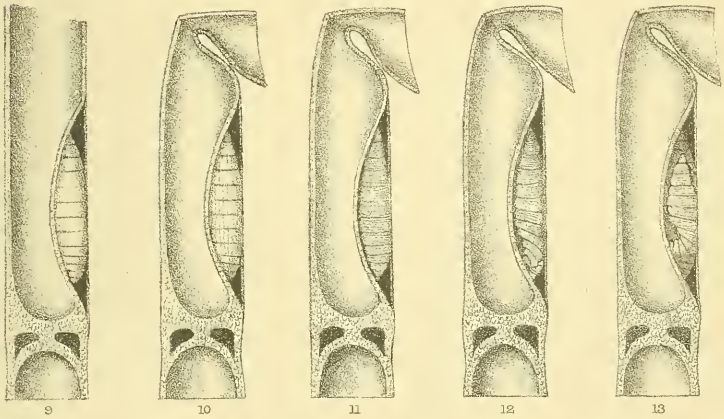
West, Newman. imp.

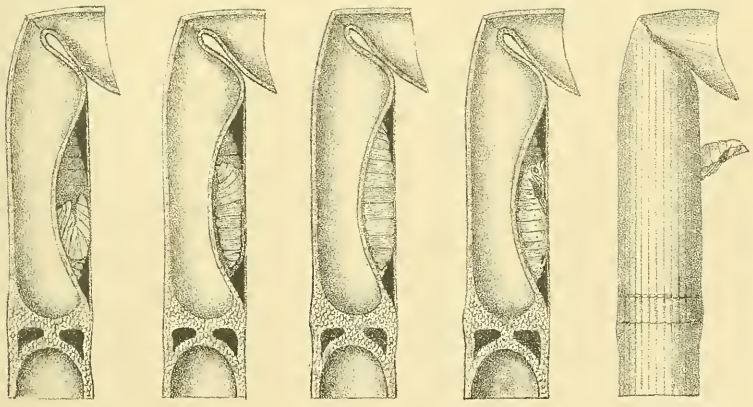
Additions to the Carabideous Fauna of Mexico.

F. H. Michael del. et lith.

Species of Xanthospilopteryx.







Fred Enock del.

West, Newman lith.

Life history of the Hessian fly.

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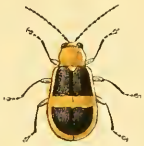

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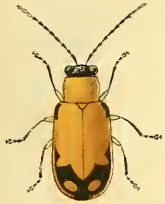

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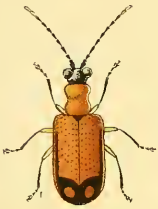

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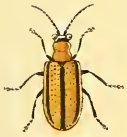

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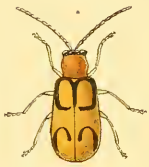

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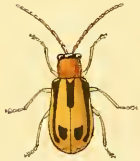

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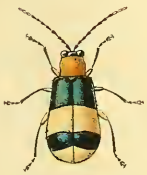

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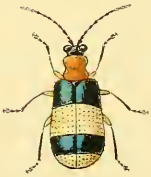

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